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Contributions.

Average Price of Locomotives.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Will you give me the average price paid for eight-wheel engines during the last ten years? In making some estimates, it is necessary for me to determine what has been the average price charged for such engines by the builders.

[The average price, as given by several makers, for standard American type locomotives, 17 in. \times 24 in. cylinders, no extras, is \$8,287.—EDITOR RAILROAD GAZETTE.]

Bridge Guard and Rerailer—Plant System.

In the *Railroad Gazette* of Jan. 17 was shown a very complete bridge floor system with guard rails and rerailing frogs as used on the roads of the Plant system. Since that article was published we have received from Mr. W. B. W. Howe, Jr., Chief Engineer of the associated roads, the sketches shown here and the following account of the development of the system:

"The plain and manifest object of a good bridge guard and floor is to pass a derailed wheel or wheels safely across the bridge. Whether this be accomplished by making the cross ties strong enough to support the wheels while derailed, or by rerailing the truck before reaching the bridge, is a matter of secondary importance, so far as the bridge is concerned. The main thing is to get the train over safely.

"In rebuilding the trestles on these roads our first plan was to provide a floor of sufficient strength to carry a derailed train over the bridge with safety, and its efficiency has been tested several times with satisfactory results. But from time to time evidence was presented that seemed to indicate that it would be wiser to provide, in addition to this floor, rerailing frogs, and thus make an attempt to restore the wheels to the rails before reaching the bridge, while the floor should still have sufficient strength to pass the train safely if the wheels fail to be rerailed. Before attempting to originate, a pair of rerailing frogs and guard rail, such as have been illustrated from time to time in technical journals, were put down on a side track and tested by running an engine and freight car over them at as high speed as was practicable, the wheels of the car having been derailed in every instance before reaching the frogs.

"The first attempt was made with the guard set as shown in fig. 1, and was completely successful in every case where the wheels did not get further from the rail than half the gauge of the track, and this they could not readily do if the rear wheels only or all four were off the rails. In this plan it will be observed that the point of the rails is just opposite the angle in the guard timbers, *b*.

"The second test was made by derailling the front wheels only, allowing the rear wheels to remain on the rails. Under these conditions the tendency for the truck to skew would carry the front inside wheel quite to the centre of the track (see fig. 1). The result of this test was failure every time and considerable injury to the guard. In this position of the wheels they could not be rerailed once with this form of guard.

The next step was to advance the angle of the timbers *b* (see fig. 2) 3 ft. beyond the point of the inside rail, and to close them in slightly, so that the derailed wheel

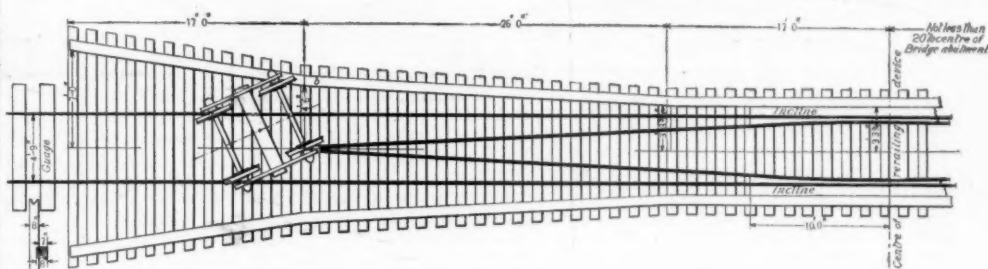


Fig. 1.

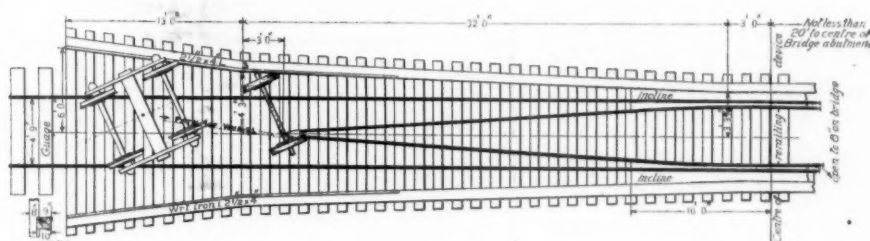


Fig. 2.

SKETCHES OF BRIDGE GUARD—PLANT SYSTEM.

would be forced to the right side of the point. The tests were repeated, and in no case did we fail to rerail the wheels in any position that they could be made to assume. The effect, however, on the outside guard timber, just in advance of the point, was to cut away its upper corner, and to correct this it was sheathed with iron. Further tests were satisfactory.

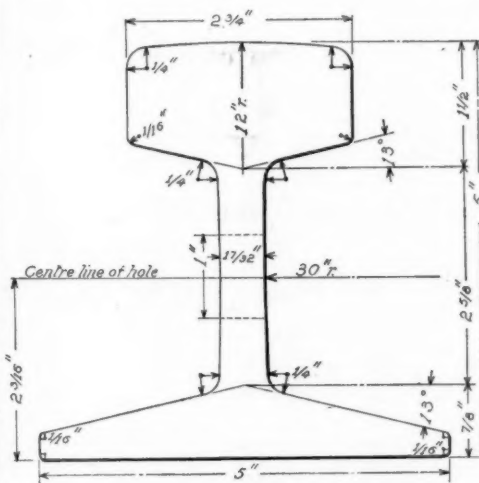
The special features of our present form of guard rail and floor for bridges are:

Cross-ties, 8 in. \times 8 in., 6 in. apart; 6 in. \times 6 in. blocks between cross ties to prevent bunching; outside guard timbers 10½ in. from rail; inside guard rail 8 in. from main line rail over the entire bridge; double rerailing frogs at each end of bridge; rails brought to a point and protected by a heavy casting.

"The efficiency of this system has not been tested in actual service further than in the experimental tests already alluded to, and it is to be hoped that these provisions will be allowed to remain in passive readiness for an emergency. Doubtless further experience will indicate that there are still defects to be corrected."

The New Erie Rail.

We show here a section of the new 80-lb. rail just adopted by the Erie as standard. It will be seen that it is designed in accordance with the modern theories as to shape of head, being comparatively broad and thin, with vertical sides and 12 in. crown radius. The distribution of metal in the several parts of the section is not,



New 80-lb. Rail—New York, Lake Erie & Western.

however, such as seems to be adapted to give the best results in manufacture. That is, while the head contains proportionately less metal, and the web and flange proportionately more than in the Pennsylvania 85-lb. rail, still the head contains more and the other parts less than in the Michigan Central, New York Central, Hunt or Delano sections, all of which have been designed with a view to avoid cooling strains, and to require the least possible cold straightening.

The following table of distribution of metal by percentages will be found interesting as comparing a number of the recent sections. Of course the New York central section there given is now old, having been designed in 1883. The C., B. & Q. section was designed by Mr. Delano, of that road, and 1,000 tons were ordered for experiment. This we showed in detail last April. The Hunt section is one of a series of standard sections

by Captain Hunt, which we published last summer. The Sandberg section is his "revised Goliath of 1889."

	Weight per yard—lbs.	Distribution of metal, per cent. in		
		Head.	Web.	Flange.
Erie.....	80	45	18	37
Michigan Central.....	80	42	21	37
Pennsylvania Railroad.....	85	47	17	36
N. Y. C. & H. R. R.....	80	44	19	37
C. B. & Q. (Delano).....	85	41	21	38
R. W. Hunt.....	85	40.33	21.29	38.38
Sandberg.....	100	45.5	22	32.5

Indianapolis Union Station.

We illustrate herewith the Indianapolis Union Station, built and owned by the Indianapolis Union Railway Co. This is undoubtedly one of the best railroad stations in the country, both in architectural beauty and in convenience of arrangement. The site of the building is almost in the heart of the city; the grounds were level and of sufficient dimensions, so that there were few obstacles to the accomplishment of an ideal arrangement of buildings and tracks. The tastefulness of the interior is particularly noticeable. The successful treatment of the main waiting room is evidently the result of very careful consideration. This room is unique; its plan dimensions are about 50 \times 145 ft., its height at the centre 64 ft. It has windows in the ends only. The very large rose windows are well conceived and effective both from the interior and exterior of the building, but they would not nearly accomplish the lighting of this large room were they not supplemented by the skylight in the arched ceiling. The simple and effective toning of the colors in this skylight and in the rose windows harmonizes perfectly with the coloring and decoration of the walls, the warm color of the marble wainscot and the beautiful wood finish which is of quartered red oak. The three great electroliers, together with numerous side lights around the room, illuminate the room perfectly. The amount of light can be regulated readily by a system of switches. The general tone is light. The harmonizing of the tints has been carried to the extent of making the lettering on the doors of gold-leaf, when black or white would have been more serviceable. The inscriptions being on transparent glass, their background generally proves to be anything but a contrast. The liberal use of polished plate glass, however, adds wonderfully to the effect of the interior. We give only the first floor plan, an interior view of the general waiting room and a general perspective view. The train shed is large and perfectly adapted to the needs of the station. It is well proportioned but, characterized by no marked peculiarities unless it be in the matter of light. The openings in the roof are sufficient to give a fair light on a cloudy day, while not large enough to admit sunshine to an oppressive degree in hot weather. The arc electric lights are ample in number and well distributed, so that the station is as convenient in the night as by day. This is equally true of the interior, where the incandescent lights afford the most liberal illumination.

The shed is immediately in the rear of the main building (on the south side of it). It is 741 ft. long and 300 ft. wide, and contains nine tracks. Further back are two through tracks for freight trains and such train and engine movements as do not need to pass through the train shed. The station is used by fourteen roads, among which are the Indiana, Bloomington & Western, the Indianapolis, Decatur & Western, the Indianapolis & St. Louis, the Terre Haute & Indianapolis, the Indianapolis & Vincennes, the Jeffersonville, Madison & Indianapolis, the Cincinnati, Hamilton & Indianapolis, the Chicago, St. Louis & Pittsburgh, the Cleveland, Cincinnati, Chicago & St. Louis, the Lake Erie &

Western, the Louisville, New Albany & Chicago and the Indianapolis Union.

The main front of the building is toward the north. On the first floor, a plan of which is given, are the waiting rooms, dining and lunch rooms, serving rooms, ticket offices and other rooms necessary for the convenience of the public. The mezzanine floor extends over the serving room and ticket offices, water closets and other small offices. It does not include the principal rooms, that is, the general waiting room, ladies' waiting room, lunch rooms and dining room. The kitchen is on the mezzanine floor, immediately over the serving room. On the second floor are three large rooms each 42 x 60 ft., besides closets, lighting and ventilating shafts, vaults, etc. The third floor is divided into a number of smaller office rooms. The main waiting room is 50 x 150 ft. and 64 ft. high in the centre.

The architecture of the exterior, the interior and the decorations, as well as the engineering features of the building, were designed by Mr. Thomas Rodd, Chief Engineer Pennsylvania Co., and Engineer and Architect for the Indianapolis Union Railway Co., under the supervision and direction of the President, Mr. James McCrea, to whose individual efforts the success of the improvements is largely due.

Five or six years ago the demands of the public and

color; the base is of black marble. The ticket window sills are of pink Tennessee marble 1½ inches thick and 14 inches wide.

One of the most interesting features in the construction of the building is the complete arrangement for heating and ventilation. It has been carried out as originally designed and specified, and has proved to be a success. The main building is heated by hot air, which is forced to the different openings by a fan blast, while the foul air is drawn from the rooms by exhaust ducts. The steam heating apparatus was arranged to heat and ventilate all of the apartments which are intended to be warmed and ventilated, to a temperature of 70 degrees Fahr. during the coldest weather, providing for a change in the air contained in the rooms once every 20 minutes. It was stipulated that when the steam apparatus was properly operated steam should circulate through the heating coils with a pressure not to exceed one pound above the atmosphere, and that there should be no snapping or pounding in any part of the apparatus; and further that there should be no appreciable loss of live or exhaust steam, or hot water, from any source, and that all machinery in connection with the apparatus should run without noise or sensible vibration. The system includes a blowing fan about 10 ft. in diameter, forcing the fresh air over steam coils through ducts into the rooms to be warmed, forcing out the vitiated air and discharging it outside of the building. The apparatus comprises blowing fan, boilers, boiler feed pumps, boiler feed water heater, condensation tank and traps, heating coils and chambers, fresh and foul air ducts and registers, hot water boilers, and shafting, pulleys, etc. The heating chamber is built of brick laid in American Portland cement mortar, the side walls of which are 13 in. thick stayed with heavy cast-iron stay bars and ¾-in. tie rods. The bottom is paved with brick, on edge, 9 in. thick, and the top is covered with 8-in. hollow tile supported by 8-in. cast-iron beams. In the heating chamber are 20 coils of 1½-in. iron pipe, or a total of 12,000 lineal feet. The heated air is discharged into a plenum chamber 50 ft. by 70 ft. by 10 ft., thence distributed by ducts.

The problem of heating and ventilating the large waiting room was successfully solved, although some misgivings were felt as to good results, on account of the very large cubical contents of the room. The room has not a large outside wall exposure, and a large air space between the domed ceiling skylight and the large lantern skylight above it contributes to the conservation of heat. The air is forced into the rooms by the fan above described. In the offices, and, in fact, all the rooms above the main floor, the heat inlets are at about eight feet above the floor, and it is found that there is not more than one degree of difference in the temperature at the floor, and at the height of a man's head, standing, except, of course, at the immediate inlet. The sizes of ducts and outlets is such that, with the maximum speed of fan, there is not a severe draft into the rooms from the heat registers. The outlets in each room, for the forcing out of the vitiated air, are distributed with a careful view to the proper circulation of heat through the apartments.

The electric light plant is very complete, and well arranged. There are 70 arc and 1,200 incandescent lights provided for. Dynamo power is provided to furnish light about one-third more than that required, and an extra dynamo is also supplied to be put into use whenever it is necessary to withdraw one of the others. The machinery used for operating the various ventilating and lighting plants is so designed that the noise of operation is not audible from the main floor.

The total cost of the improvements, including real estate, amounts to about \$1,200,000.

Washing Locomotive Boilers.

At the last meeting of the Western Railway Club one of the subjects discussed was "The best method of washing locomotive boilers under circumstances where there is not sufficient time to cool the boiler for this purpose."

No paper was read. The discussion was, in brief, as follows:

Mr. BARNES (Railroad Gazette): I understand that some parties are advocating the use of the fire-brick lining in fire boxes all over the inside about 6 in. thick, hoping thus to secure more complete combustion of the gases. As there has been some difficulty already experienced in washing locomotive boilers before the fire-brick gets cool, probably there will be more inconvenience in washing boilers which are so thoroughly lined with fire-brick.

Mr. HUGHES (Fox Solid Pressed Steel Co.): In running about 200 miles with petroleum fuel and fire-brick lining the difficulty of cooling down was so great that I had to increase the number of engines, owing to the accumulated heat and the difficulty of cooling the engines down before we could wash out.

Mr. MORRIS (C. & B. & Q.): We have experienced difficulty in washing out engines from the arch brick retaining its heat. We adopted a plan of putting cold water in with the hot water before emptying the boiler and washing out, and, after letting the boiler stand for possibly eight hours, I have not as yet experienced any trouble in washing out. Let the cold water run in with the hot water, and of course open the boiler so that the water can run out, and commence washing just as soon as the plugs are open.

The PRESIDENT: Do you let the cold water run in while the hot water is running out?

Mr. MORRIS: No, sir; turn the cold water on while the hot water is yet in the boiler, and then let both run out together, and commence washing at once after I say, the boiler has stood about eight hours. Of course, it requires a greater number of engines to do that way. You cannot wash out immediately.

The PRESIDENT: Have you any trouble with your side sheets cracking?

Mr. MORRIS: No, sir; we have not experienced any trouble since we adopted that plan.

Mr. PECK (C. & W. I.): For an engine with brick arches, I blow the steam off as soon as the engine gets in and then start the cold water in and the hot water out; in that way change the temperature of the water until it gets cool—do it in forty minutes—and then wash the boiler out. But I am strongly in favor of the water-leg to take the place of the brick arch.

Mr. MORRIS: I had some experience with the water leg, and, while it increased the heating surface of the fire box, we had a great deal of trouble keeping it tight, for some cause or other, and abandoned it for that reason, and put in the brick arch.

Mr. PECK: Water-legs are not very tight on top, and they are likely to leak. To stop that we put a circle pipe in from the crown sheet down to the top of the water leg. After that it never leaked a particle until it wore out.

Mr. MORRIS: That experiment was tried with us and it burst one of the circling pipes and scalded the fireman, and we abandoned it, but we had considerable success and some trouble with a water table that covered the entire area of the fire box, excepting, of course, what is termed a manhole, large enough to permit the gases and smoke to go through.

Mr. HARRISON (B. & O.): In the new mogul engine that we are using on the Chicago division, we use the brick arch. We abandoned the water-leg several years ago. It was riveted on the front crown sheet, and the incrustation collected so rapidly it burnt it out. If the incrustation accumulating in the water-leg can be prevented, it certainly is better than the brick arch. On the brick arches that we are now using I put in head bolts. We are using brick arches on our passenger engines as well as some of our freights. I have had some experience with the side sheet cracking, but I have had more side-sheet crackings without the brick arch than I have ever had with it. We can't go more than an average of about seven months with freight engines until we have to clean the flues and crown bars, and about twelve or thirteen months with the passenger engines, on account of the incrustation. We are now introducing the wash plug to wash off the top of it, and we do not stop to wait for the arch to cool off, but wash and clean the engine at once.

Mr. FORSYTH: Do you put water-legs in the new fire boxes that you are building?

Mr. HARRISON: No, sir. We are not building any of them now. I would like to add this information. When



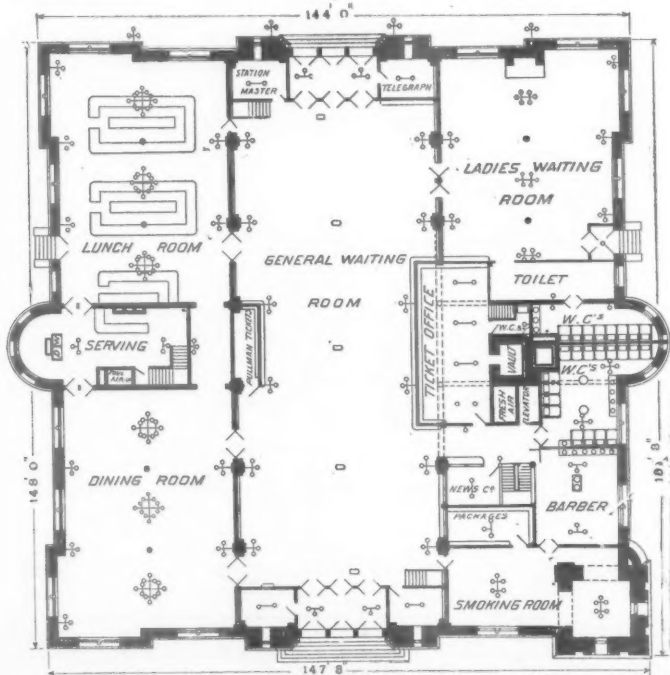
Perspective from a Photograph.

the railroads for better accommodations were so urgent that it became necessary to take up the question of additional facilities with the view to provide a suitable station. In order to do this valuable property had to be acquired and certain rights secured from the city of Indianapolis. In the year 1885 the Indianapolis Union Railway Co. started to provide a complete station. Mr. James McCrea, President, and Mr. V. T. Malott, Vice-President, had in hand the securing of a proper site. Advantage was taken of the desire of owners in various locations to secure the station near their property, to obtain options on sufficient ground for the station at two locations besides the present one, which is where the old station stood. Options were also secured on sufficient additional ground in the neighborhood of the old station to provide for the new one. Negotiations were carried on with the city to secure the rights needed over streets and to vacate parts of streets. In 1886 these negotiations were closed and property purchased at the present site. The railroad company had to incur various obligations as to the Illinois street tunnel and certain viaducts in order to acquire the rights needed. Meantime, quite a number of plans had been prepared by different architects for the buildings, and various plans were prepared and considered for the tracks, train house and other necessary improvements. The structure was commenced in December, 1886, and the whole improvement completed in September the following year.

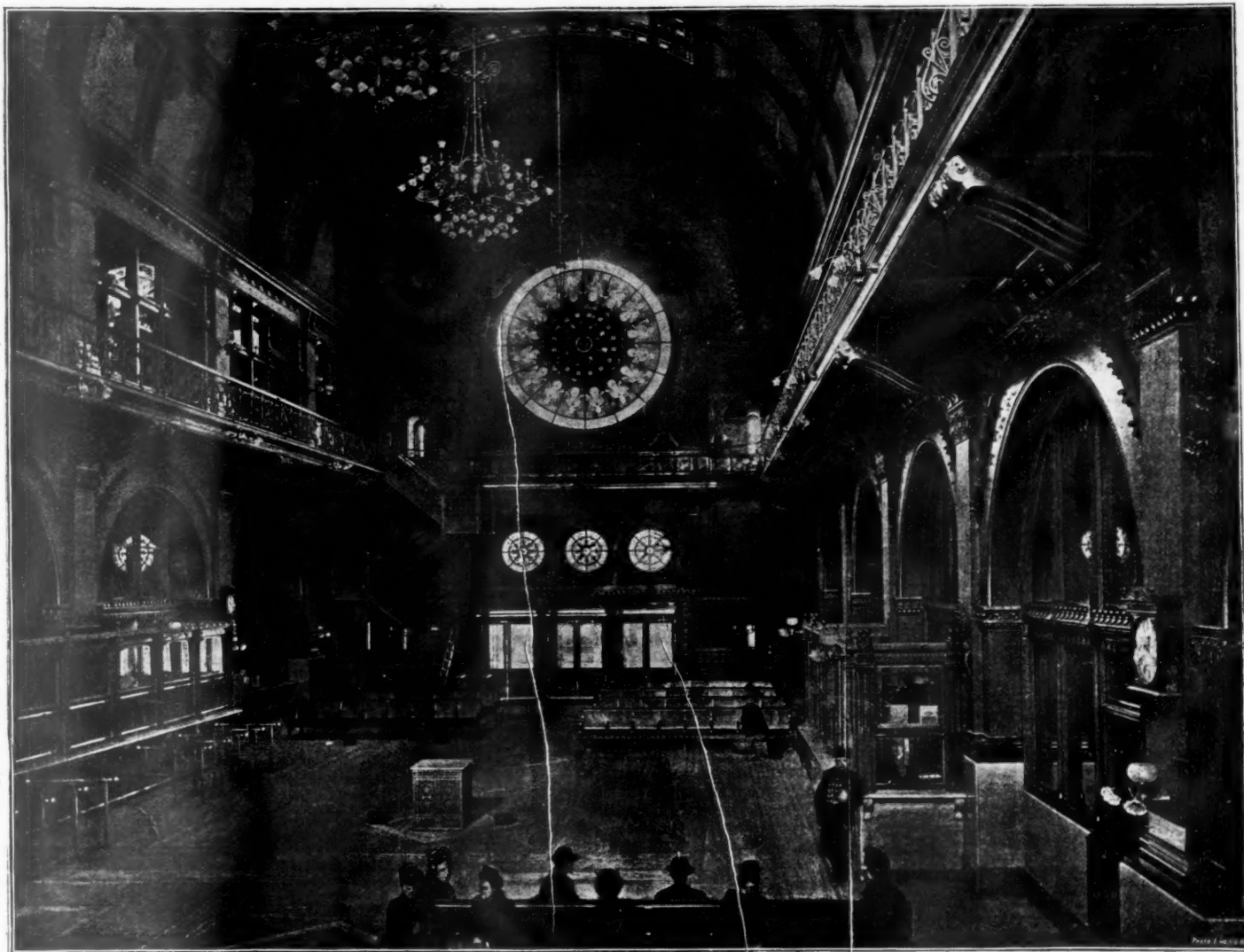
The station building is of pressed brick with granite base and brown stone trimmings and cornices. All of the pavements surrounding the buildings are of asphalt. The sidewalks are made of cement concrete. The yard in the rear of the building is also paved with cement concrete.

The foundation masonry is of Flat Rock limestone; the mortar is made of one part cement and two parts clean, coarse, sharp sand. The cements were subjected to tests for uniformity, strength and fineness. The concrete under the tower is mixed with the following proportion: One part Portland cement, two parts sand, gravel and stone spalls. In this bed of concrete, which is 3 ft. thick, two courses of steel rails are laid. The tower masonry is of block stone in courses of the same height as the face stone. The exterior is of granite with sandstone trimmings. The steps and door sills are made of blue Bedford limestone, except the two main entrances, where granite sills are provided. The cut stone base of the tower is red granite. Other cut stone is of red brown sandstone.

The main waiting room is wainscoted with marble about five feet high. The marble is of a warm reddish



Indianapolis Union Station.—Plan of Ground Floor.



THE INDIANAPOLIS UNION STATION.—INTERIOR OF GENERAL WAITING ROOM.

we want to get an engine out in a hurry and we happen to have another one close by with steam on, we disconnect the pipe and connect with a hose to the injector to fill the other engine. In that way we very frequently help ourselves in some of our shops. At Garrett, Indiana, we have piping running all around the shop connected with it, and we let the water in quite warm.

Mr. JOHANN: The main objection that I had to water legs and the reason why I stopped using them was more particularly from the trouble of chafing of the turning point of the water-leg by cinders from the fire coming up there, which invariably would, in eight or nine months' time, cut it out so thin that it would be pretty hard to keep it tight. That is about the only trouble I have ever had with water-legs, and it was so bad that I had to abandon them. Brick arches I consider to be of some advantage. So far as the washing out is concerned, I think the most proper way to do that, where you haven't time to let the engine stand long enough for the water to cool and run off, is to attach your cold water pipe to your feed pipe and inject cold water right into the hot water, and start the hot water to running out at the blow-off, and when it has accumulated enough so that it is cool enough to take out a handful of plates, take it out and wash it. In that manner we usually get an engine away inside of two and a half hours.

The PRESIDENT: Filled with cold water?

Mr. JOHANN: Filled with cold water. We keep pumping cold water until the temperature of the water gets down; keep right on filling in. That is a matter that is pretty hard to regulate on all railroads. I have had the same trouble that we all complain of: we have never had engines enough. We have to hurry around, because when they want an engine to go out with a train we have to have it ready, no matter at what expense. But I find the plan I have mentioned the best plan of washing out. I never had any bad results from it, used in that way.

Mr. BARNES: What was the material used in the water-leg, and were you sure that it was not incrustation from the inside that cut the sheets out rather than the cinders from the outside?

Mr. JOHANN: The material that we had in the water-legs was copper, a little soft; but we had no specially beneficial results as I thought from it, and therefore I did not undertake to renew it by steel, as I might have done. I never run any with steel; it was all copper, and that would not last over six or eight months.

Mr. RHODES: The water-legs I had reference to as lasting the life of the fire-box were steel.

Dump Cars and Gondolas.

The following are extracts from a private letter written by Mr. John M. Goodwin to a gentleman who was investigating the subject of comparative economy in handling ore and like material by rail. They give a careful comparison of the relative service capacity of dump cars and gondolas drawn from actual practice.

"A proper four-wheeled dump discharging its load between rails or at the side, as desired, occupies in train, as

extended, 20½ ft. of track room. It carries nominally 30,000 lbs. of ore; on 4 in. x 8 in. journals it would, in practice, ordinarily be loaded to considerably more than 30,000 lbs. One objection to four-wheelers has been that they don't carry, per foot of train, for example, as much as eight-wheelers. The 60,000-lb. gondola stands 38 ft. in train, and, loaded to its nominal capacity, one of these cars would carry 1,666½ lbs. to the train foot. My car, 20½ ft. in train, loaded with 30,000 lbs., carries but 1,463½ lbs. per train foot. But in practice the big gondolas, 50,000 lbs. and 60,000 lbs. capacity, as they run together, cannot, or do not, carry up to even the 50,000 lbs. figure. My dump body will carry safely all that the journals under it will carry; while we find that, in practice, the gondola body does not (presumably because it cannot) carry its nominal load, or the load which the journals under it might safely carry.

"A certain lot of 101 gondolas, loaded with ore, from Ashtabula, in October, 1889, carried an aggregate load of 3,955,665 lbs. (= 1,977½ tons), making the average load per car 39,165 lbs. They occupied 3,610½ ft. in train, and carried 1,095.6 lbs. per train foot on 808 wheels and 404 axles. A train of 177 Goodwin dumps (20½ ft. in train each) would occupy 3,628½ ft. of track, and on 708 wheels and 354 axles would carry 5,310,000 lbs. of ore; or 1,463.4 lbs. per train foot, an aggregate load 677½ tons greater than that carried by the 101 gondolas and schooners.

"Anticipating an objection on the part of somebody who has not particularly investigated these matters, that the 101 cars were probably not doing the service ordinarily performed by cars of their class, I add the fact that of 9,509 eight-wheeled cars of various modern styles received at one establishment in the Shenango Valley in 1889, carrying furnace stock and supplies (ore, limestone, coke, sand, clay, firebrick, etc.), and presumably loaded in each instance to the extreme allowed limit, the average cargo was 38,008 lbs., or 1,157 lbs. less than the average load of the 101 cars; and of 3,014 cars loaded out from said establishment in 1889 with pig metal, blooms, or muck bar, the average load was 38,705 lbs., or 460 lbs. less than the average load of the 101 cars.

"Of a group of 181 gondolas and schooners coming, in 1889, with ore from Erie, Ashtabula and Cleveland, respectively, the average load was 39,041 lbs. Of these 181 cars, 50 carried an average load of 34,218 lbs. only, and these kept the general average down; but the lot of seven of the 181 cars, which carried the heaviest loads in the whole group, did not average as high as 50,000 lbs. per car.

"These 181 cars occupied in train at least 6,470½ ft.

They had under them 1,448 wheels and 724 axles, and carried an average of 1,092½ lbs. per train foot. Two hundred and thirty-five Goodwin dumps, with 940 wheels and 470 axles, occupying 4,817½ ft. in train (or 1,653 ft. less than the 181 eight-wheelers) would carry the aggregate load of the 181 cars.

"Counting the cost of unloading the gondolas at 5c. per net ton, the outlay for discharging the 181 cars was \$176.66. The dumps would unload themselves without appreciable cost; and, moreover, one-half the outfit of dumps (that is to say, 118 dumps) would, in this ore trade, perform a considerably greater tonnage service in any given period of, say, 10 days or 30 days, than the gondolas ever did or ever will perform.

"Now, allowing that a 50,000-lb. gondola may be had today for \$350, then the 181 cars represent an outlay of \$63,350. Allow that the dumps cost each as much as a gondola (which is not the fact, "by a long chalk"), then the 118 dumps would cost \$41,300; and in endurance and serviceable qualities generally, in the lines of traffic for which they are designed, the dumps are largely superior to any eight-wheeled gondola or like car. Five of my dumps have been in service for four years, hauling (and distributing along the road) furnace cinder taken hot from the cinder bed. They have made each two trips per diem (Sundays excepted) throughout the whole period named, averaging 14 miles out and 14 returning, 28 miles per round trip, 50 miles per diem, 17,528 miles per year, 70,112 miles in the four years; have carried 10 tons cinder per trip, = 20 tons per diem, 6,200 tons per year, 25,040 tons in the four years; 25,040 tons carried 14 miles = 350,560 ton miles per car. In the four years the five cars have hauled and distributed along track 125,200 tons of cinder. Each car made 230 ton miles per diem, right along. You know, from your own investigations, made in February, 1887, that the average gondola car in ore trade between Cleveland and the Shenango Valley makes a total travel of about 13.37 miles per diem, and makes, in a period of 30 days, 2.39 round trips. She carries (average) 17 tons of ore, we will say; although of 50 cars from Cleveland lately, noted by myself, the average load of ore was no more than 15,240 tons. We will say that she has one back load of pig metal of 17 tons; then in 30 days' time she would make 401.1 miles travel and 4,826.64 ton miles. Now, the four-wheeled dumps above mentioned made each in 30 days' service 1,680 miles travel and 8,400 ton miles—more than four times the travel and nearly twice the ton mileage of the eight-wheeled gondolas in question.

"The four-wheelers were capable of carrying consider-

ably more than 10 tons of ore. They could, however, stow no more than 10 tons of furnace cinder. Before inquiring as to what the dump, carrying 30,000 lbs. of ore, would have performed in the run made by the cinder-carrying dumps, we will note that, although handicapped by carrying bulky stuff, the wheel mileage in case of the four-wheeled dump was not unduly in excess of that of the gondola. As you will note, the wheel mileage of the dump in making 8,400 ton miles was no more than 6,720 wheel miles, while the wheel mileage of the gondola in making 4,826.64 ton miles was 3,208.8 wheel miles. For each wheel mile the gondola made 1.5+ ton miles; and the dump made 1.25 ton miles per wheel mile. But having credited the gondola with tonnage beyond her capacity in practice, we should now credit the dump with 30,000 lbs. (13,333r) for each load carried in the actual run which we are considering. This being done, we have account thus: Dump = $(1\frac{1}{2} \times 840) \times 13,332\frac{1}{2} = 11,250.12$ ton miles; and making 6,720 wheel miles, as she did, she makes 1.67+ ton miles per wheel mile."

The Michigan Central Compound.

This locomotive does not differ materially in its general construction from the other ten-wheelers recently built for the Michigan Central Railroad by the Schenectady Locomotive Works. It is of the ten-wheel type, with a rigid truck front and blank tires on the forward drivers. The single expansion locomotives have been running with commendable economy since their introduction, and the operation thus far of the double-expansion engine is such as to warrant expectations of increased economy. The character of the construction of this locomotive is such as to give the compound principles a chance to show what is worth. It is not hampered with multiple cylinders or connections, and has no complicated parts, as has been the case in many of the recent French compounds and some of the English.

The following are the ruling dimensions:

Cylinders—	
High pressure.....	20x24 ins.
Low pressure.....	20x24 ins.
Steam ports—	
High pressure.....	18x2½ ins.
Low pressure.....	20x2½ ins.
Exhaust ports—	
High pressure.....	18x3 ins.
Low pressure.....	20x3 ins.
Bridges—	
High pressure.....	1½ ins.
Low pressure.....	1½ ins.
Travel of valves in both cylinders.....	6½ ins.
Outside lap—	
High pressure.....	1½ ins.
Low pressure.....	1½ ins.
Inside lap—	
High pressure (as yet unsettled—see text).	
Low pressure (as yet unsettled—see text).	
Valves, Allen Richardson balanced, both cylinders.	
Weight of auxiliary parts.....	¾ in.
Weight of low-pressure piston and rod.....	600 lbs.
Ratio of area, h. p. to l. p. cyl.....	2.1 to 1
Diameter of boiler.....	58 ins.
Thickness of sheets in shell.....	9-16 in.
Length of fire box.....	36 3-16 ins.
Width of fire box.....	42½ ins.
Thickness of sheets in fire box.....	¾, 5-16 and ½ in.
Number of tubes.....	247
Length of tubes over tube sheet.....	12 ft.
Diameter of tube, outside.....	2 in.
Total heating surface.....	1,670 sq. ft.
Area of grate.....	28.5 sq. ft.
Boiler pressure.....	180 lbs.
Diameter of drivers.....	48 in.
Diameter of truck wheels.....	30 in.
Rigid wheel base.....	6 ft. 3 in.
Driving wheel base.....	12 ft. 3 in.
Length main connecting rod centres.....	9 ft. 5 in.
Total wheel base, engine.....	22 ft. 6 in.
Total wheel base, engine and tender.....	48 ft.
Weight on drivers.....	37,000 lbs.
Weight on truck.....	20,800 lbs.
Total weight of engine in working order.....	125,800 lbs.
Tank capacity.....	3,700 gals.
Coal capacity.....	8½ tons.
Weight of tender loaded.....	80,000 lbs.

Boiler and fire box, steel; centres, semi-steel; tires, drivers and truck, Krupp steel; tender trucks, Schenectady Locomotive Works patent 4-wheel, channel iron bolster. Fire brick in fire box on water tubes; rocking grate. Balanced throttle valve. Stack, 18 in. diameter inside, 14 ft. 9¾ in. above rail. Two Monitor injectors.

This locomotive has been constructed to burn soft coal and has been started off with an exhaust nozzle 4½ in. in diameter. So far the fires have burned satisfactorily, and there is an expectation that the diameter of the nozzle can be increased. The valve motion is the regular Stephenson link of long radius, having eccentric rods extending over the front axle. It will be interesting to note the manner in which one of the difficulties with the two-cylinder compound engine, i. e., the extreme width over cylinder, has been overcome in this case. The low-pressure cylinder, has been flattened off on the outside to reduce the total width over the cylinders to a little less than the length of the bumper beam.

The operation of this locomotive is similar to other two-cylinder compound locomotives which were illustrated in the *Railroad Gazette* last year. Steam passes direct to the high-pressure cylinder, which of course is the small cylinder, from the boiler in the usual manner, and the exhaust is carried through a copper pipe 6½ inches in diameter, which serves as a receiver, extending over the interior of the smoke box to the low-pressure cylinder, entering the steam passage therein, as is customary in all locomotive cylinders. From the low-pressure cylinder the steam is exhausted as usual, through a single exhaust nozzle, as there is only one cylinder from which to exhaust. So far as the interior construction of the cylinders is concerned, there is little

difference from those used on the ordinary locomotive. The fires are blown with two exhausts per revolution of the drivers rather than four as with the ordinary engine. This "long-drawn-out puff," as the Germans call it, seems to produce even a better draft than the more frequent sudden puffs with which we are so familiar. In order to prevent an excessive pressure in the large cylinder, safety and air valves are placed on both front and back heads.

Between the steam passages in the high-pressure cylinder saddle and a passage in that cylinder which is connected at one end of the intercepting valve on the low-pressure cylinder there is placed a reducing valve through which fresh steam passes direct to the low-pressure cylinder at starting, and by which it is reduced from the boiler pressure, 180 lbs., to 90 lbs. before it goes to the passage leading to the intercepting valve on the low-pressure cylinder. In starting, the steam passes direct from the steam passage in the high-pressure cylinder through the reducing valve to the intercepting valve and thence to the low-pressure cylinder. The action of this intercepting valve is not unlike those of Worsdell & Von Borries. It acts automatically, and yet is connected to the cab in such a manner that it can be operated by the engineer if necessity requires. In construction, it is a double piston valve whose direction of motion is parallel with that of the pistons in the steam cylinders. It is located in the saddle of the low-pressure cylinder, and on the front of that saddle there is a cover which can be removed to examine the interior of the valve chamber when necessary. On the rear side of the low-pressure cylinder saddle, opposite to the intercepting valve, is another cover to which is attached an oil cylinder which regulates the rapidity of the motion of the intercepting valve and prevents it from bottoming suddenly. It is at this point that the connections to the cab are made. The piston rod of the oil cylinder extends through the rear cover of the cylinder, and has at its outer end a lever and connections reaching to the cab, as shown on the drawings. While this valve is entirely automatic, yet it is arranged so that the engineer can operate it if necessary.

The steam, after passing through the reducing valve, continues through the passage provided therefor to one end of the intercepting valve and pushes it forward, thus opening a port which allows reduced steam to enter the low-pressure steam chest. As the intercepting valve moves forward it closes the opening between the copper exhaust pipe from the high-pressure cylinder and the low-pressure steam chest. Thus it is not possible for reduced steam to back up against the high-pressure cylinder. Under these conditions there can be full boiler pressure on the high-pressure cylinder and one-half boiler pressure on the low-pressure cylinder, with no counteracting pressures on the opposite side of either piston. When the high-pressure cylinder exhausts the pressure created in the copper pipe receiver and on the opposite end of the intercepting valve, it is sufficient to push that valve back to running position. In its movement it closes the port which it opens to admit reduced steam to the low-pressure steam chest in the first instance, and opens the main passage for the exhaust steam from the high-pressure cylinder through the copper pipe receiver to the low-pressure steam chest, and the engine commences to work compound.

There is on each steam chest a safety and air valve combined. It is placed on the rear of the steam chest, near the stuffing-box; the safety valve on the low-pressure chest being set at 100 lbs.

In operation this locomotive has been found to be satisfactory with respect to starting trains, and unless something unexpected comes up in future operation, this may be accepted as conclusive evidence that the compound locomotive will start trains as readily and satisfactorily as the ordinary engine; and this settles a dispute which was in progress last year, and agrees exactly with the ground taken by the *Railroad Gazette*.

In the list of dimensions we have referred to the text for the amount of inside lap to the high and low pressure cylinders. As the lap with which the engines were constructed at first has been found to be not quite satisfactory, and as the changes for the future are not yet determined, it is thought best to omit them from the list of dimensions. The original laps were line and line inside for the high-pressure cylinder and ½ in. inside each side for the low-pressure cylinder. Further comment on locomotives of this type and their operation will be found in the editorial columns.

Ventilation of Cars.

At the last meeting of the Western Railway Club, Mr. W. J. Creamer read a paper on ventilation of passenger cars, extracts from which we published last week.

In the discussion which followed Mr. MARTIN, of the Martin Anti-Fire Car Heater Co., showed a device for hanging the window sashes of cars in such a way that the windows could be swung outward in either direction, depending upon the way in which the car is running, and thus produce an exhaust. A window so arranged is a deflector as well. He also said that on some roads where the Martin heater system is in use arrangements had been made to take in air from the side of the car, carry it along the radiating spurs placed under the seats and distribute it after it is thus warmed. Mr. Martin pointed out further that his proposed method of arranging the windows obviated the necessity for sliding them up, and thus the coach framing could be stronger.

Mr. PULLMAN described the Creamer device somewhat

more specifically than had been done in the paper which was read. It is intended that the air should be taken in on the side of the car, carried to a box around the heater pipes, and thence distributed by radiators. Provision is made for an exhaust in the clear story.

Mr. GRIEVES (Baltimore & Ohio) said that his road has been using the Creamer ventilators somewhat extensively. He finds that the ventilator is an efficient exhaust, and does not admit cinders.

Mr. JOHNSON said that he did not consider that it was necessary to provide both for taking in and for exhausting the air by power; that one result would necessarily follow the other. If a successful aspirator is used to take the air out, fresh air is bound to find its way in, and vice versa. For various reasons he thought, however, that it was desirable that air should be forced in and allowed to find its way out.

Mr. BAKER, of the Baker Heater Co., proceeded to show that the motion of the car could not be relied upon to force in a sufficient quantity of air for adequate ventilation; that is, that the current produced by the motion of the car might be exactly in equilibrium with that produced by the velocity of the wind. He considered it best to make the ventilation entirely independent of the heating.

Mr. RHODES (C. B. & Q.) said that in the first place it was necessary to consider carefully whether the evil is as general as was assumed. While many passengers complain of inadequate supply of air, others would find the supply too great. The device for a swinging window he did not consider practical, as it was important to utilize all possible width of the cars, consistent with proper clearance, for increasing the chair space inside. He doubts whether any traveling man selects routes having cars provided with special ventilating apparatus in preference to others; doubts if he knows that there is any difference. While he is an advocate for better ventilation, he doubts the practicability of the methods presented at the meeting.

Mr. SCHROYER (C. & N. W.) had used for some time a method by which air was taken in through a funnel on the roof, forced down through a jacket around the heater, thence admitted to the car. This device works very nicely for a while, but the pipes get filled up with cinders, and then it becomes useless. They are now experimenting with a method of ventilation by admitting air to a box inclosing in a steam radiator, which stands where the coal box was formerly placed, at the end of the car. This air when heated is allowed to escape along the floor of the car.

Mr. FORSYTH (C. B. & Q.) related his actual experience in coming from Aurora to attend the meeting, which was that the doors of the car in which he rode were rarely opened, the air became very foul, and the porter said that with the Baker heater and single windows the car could not be properly heated if the ventilators were open. That is, the capacity of the heater was insufficient if the air was changed rapidly enough to insure the desired purity. In his opinion, double sashes are a necessary preliminary. He thought, further, that people should not be discouraged about ventilation until they had made sure that trainmen were properly instructed as to the use of the devices with which the cars are now equipped. He thinks that there is very great carelessness and indifference to this matter in the operating departments, and the thermometers which are hung on the curtain rails of sleeping cars cannot possibly give any correct indication of the temperature where people sit. He would strongly urge double sashes, thermometers with large graduation, which need not include a great range of temperature, and then careful instruction of the trainmen in the use of the material which they have.

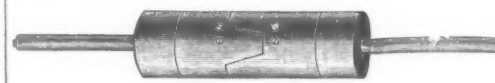
The subject of "Link Motion," which was to have been discussed, was put over until the next meeting, as was that of the "Use of Malleable Iron and Pressed Steel in Car Construction."

The President appointed Messrs. Forsyth, Crossman, D. L. Barnes, Peck and Schroyer a committee to consider the propriety of the publication of the proceedings of the Western Railway Club in pamphlet form, and in such manner as to increase the revenue of the club, such committee to report at the next meeting.

The meeting then adjourned to meet the third Tuesday in February.

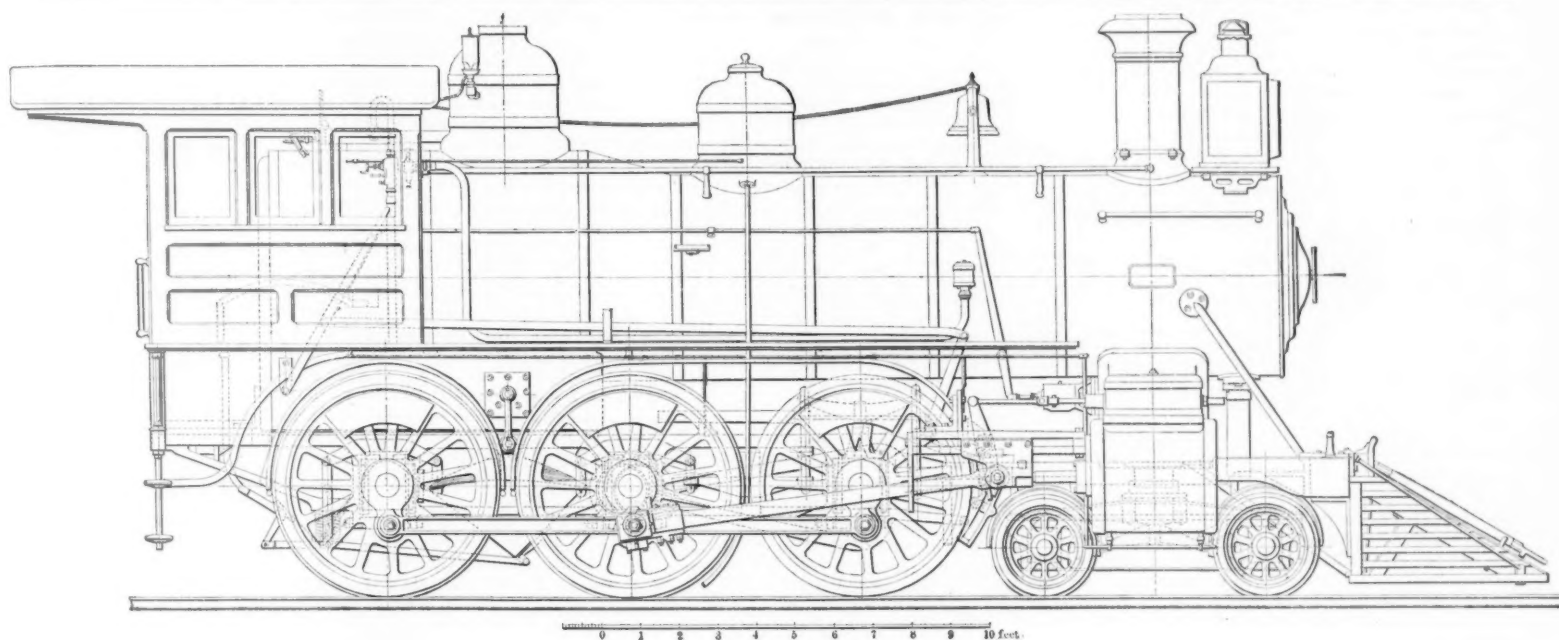
The Johnston Electric Train Signal.

A train on the Boston, Revere Beach & Lynn was equipped some six months ago with this device, and recently, by invitation of the Johnston Electric Train Signal Co., a number of gentlemen were able to see to its workings. A run was made to Lynn and return, the signal being worked and examined. Among those pres-

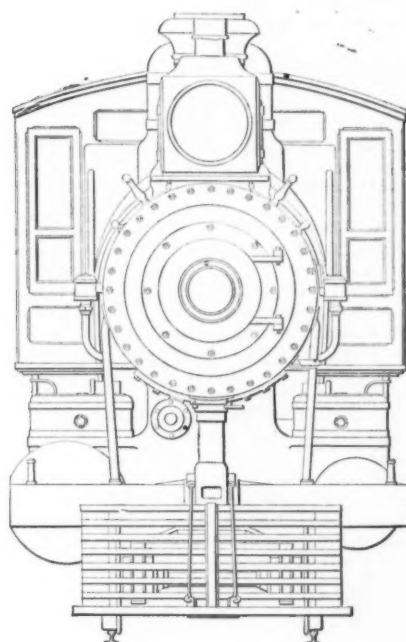
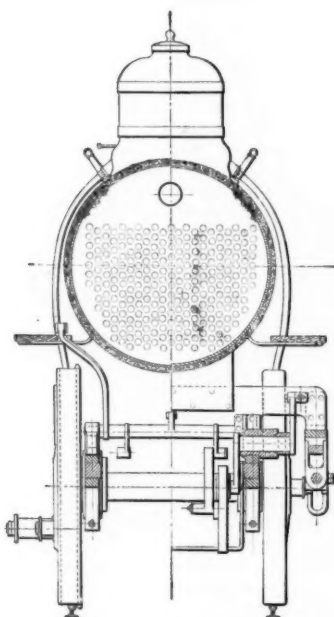
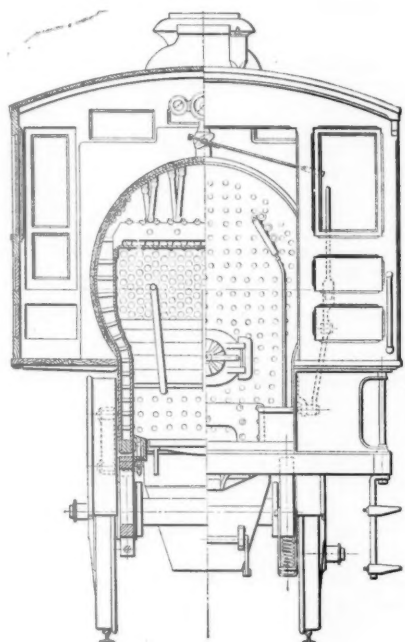


ent were Railroad Commissioners E. W. Kinsley and E. A. Stevens, Messrs. J. W. Marden, Master Car Builder, and E. A. Smith, Electrician of the Fitchburg; Joseph Smith, Superintendent Air Brake Department of the Old Colony; H. N. Rowell, Electrician of the Boston & Maine; R. C. Fraser, of the *Railroad Gazette*; J. F. B. Kimball, of the Boston & Albany, and Luther S. Johnson, B. F. Spinney, Joseph N. Smith, Charles H. Newhall, John S. Bartlett and H. A. Pervear, Directors of the Thomson-Houston Co. On the return to Boston the guests were taken to Young's, where a lunch was served.

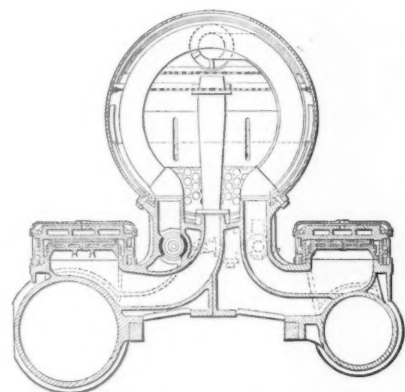
In this system the means of communication is by sev



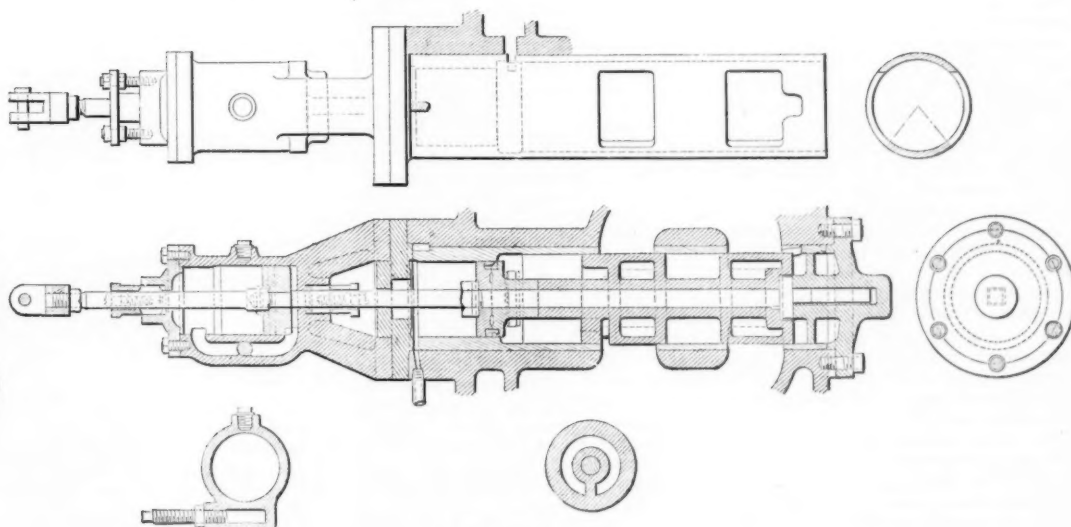
General Elevation.



Sections and End Elevations.



Section, Cylinders and Smoke Box.



Intercepting Valve.

COMPOUND LOCOMOTIVE—MICHIGAN CENTRAL RAILROAD.

Built by the SCHENECTADY LOCOMOTIVE WORKS, Schenectady, N. Y.

eral insulated wires made into a cable about the size of an ordinary bell cord, which is suspended in hangers in the usual way. At intervals of 12 ft. or more push buttons controlling the circuit are introduced in this cable. These buttons are well protected from dirt and moisture and frequent use keeps the contact points bright. The Burnley dry battery is used, being placed in the cab, under the fireman's seat or in other convenient place. Being placed at convenient intervals in the car and on the platforms, the button can be pressed by the conductor and the bell sounded in the cab. The

coupler between the cars is of hard rubber, cylindrical in shape and dovetailed together, as shown in the cut. This is connected and disconnected by means of bronze hooks, the compartments which they occupy being, like the button, impervious to water, dust, smoke, and consequent corrosion. When the coupler is pulled apart the circuit is closed automatically, causing the bell in the cab to ring until it is cut off, which is accomplished by coupling the loose ends into a stationary coupler fastened underneath the hood over the platform. The cable exposed to the weather and friction is protected with rub-

ber tubing, and this is clamped by a washer, which prevents the cable being pulled through the car.

The signal may also be applied to freight trains, in which case a bell can be placed in the caboose, and in the event of the train breaking the bells would be sounded automatically and simultaneously in the cab and caboose. This signal has been in use for trial on the Boston, Revere Beach & Lynn road for a year and has worked satisfactorily. Further information may be obtained from the Johnston Electric Train Signal Co., 620 Atlantic avenue, Boston.

The Snow Blockade on the Pacific Roads.

The situation on the Central Pacific has grown worse instead of better, additional snow having fallen and made the blockade worse even than was indicated by the reports published last week. On Thursday, Jan. 24, General Superintendent Fillmore made a report, from which we extract the following:

We have about 24 ft. of snow on the level in Summit Valley, 12 to 18 ft. at Emigrant Gap, Cisco and Cascade; 12 ft. at Blue Canyon, 8 ft. at Alta, Dutch Flat and Gold Run; 7 ft. at Colfax, 4 ft. at New England Mills, 2½ ft. at Redding and 2 ft. between Middle Creek & Southern Station. We have from 6 to 8 ft. on the level from Southern north to Edgewood over the Summit, and the cuts the entire distance are drifted bank full between Gold Run and Blue Canyon. No trains have passed over these divisions since the 14th. The rotary plow is now working on the road between Blue Canyon and Shady Run. In many of the cuts it has been covered up, as well as the engine next to it. This plow has been doing most excellent work, and if we had had three or four of them instead of only one I think we should have kept the road open without much delay.

It appears that on the 22d considerable progress had been made, and the officers were hopeful of soon clearing the road, but on that day it began to snow again. In a large territory around Sacramento and in other portions of California where the climate is mild there have been extensive floods, but no details are given of the damage to the railroads, which, apparently, was not extraordinary. A very heavy snow and wind storm has prevailed in Eastern Nevada and Utah, and two engineers and three firemen were killed by engines becoming derailed by the wind. Heavy land and snow slides have occurred at Delta and north of Dunsmuir (on the line to Oregon). At a point about a mile north of Upper Soda Springs, a snow slide came down the mountain and dammed up the river so that its bed was dry for half an hour below the dam. A portion of the slide crossed the river, breaking off trees at the stump, 2 and 3 ft. in diameter, like pipe stems.

The following account from Vice-President C. F. Crocker, of which portions have been printed in the daily papers, has been kindly furnished us by Senator Stanford. It contains some facts of interest not heretofore published. The dispatch is dated Jan. 27.

"All northern and middle California has been subjected to a recurrence of one of those rigorous winters with which old Californians are familiar. The first storm of this season commenced about the middle of October, and for that season was very unusual in its severity. In the latter part of October and early in November about a week or ten days of cessation was followed by the inauguration of a storm, the distinctive storm conditions of which have not abated up to the present. The storm has remitted in its fury for the space of one and two days occasionally in the period, but we have experienced practically a storm condition as if proceeding from the same storm centre and without abatement for a period of over 70 days, during which time we have had at least 60 days of actual precipitation of rains in the valleys and extending a very considerable distance up the flanks of the mountains, with snow on the higher altitudes and summits of all the mountains in the state. On the higher altitudes snow continued even during the short periods of intermission of storms in the valleys. The ordinary means of resistance to storm effects were at once employed and increased to even extraordinary proportions, but on high altitudes the storm was uniformly accompanied by tempests of wind which filled the air, with fallen as well as falling snow which drifted in the cuts made by snowplows. This obliterated their work as fast as accomplished. Beyond this the unusual accumulations of snow on the slopes of ravines and cañons were delivered into cuts by snowslides carrying earth, rock and trees on to the track.

"The rigorous character of these winter storms may be inferred from specific data. At one point in Santa Cruz County, up to last Saturday, 84 in. of rain had fallen. At many points on the line of the Central Pacific 60 and 70 in. of precipitation, including rain and snow, has fallen, where the annual average does not exceed 30 in.

"In the cañon of the Sacramento about Redding 75 in. has fallen, where, in ordinary winters, the rainfall does not exceed 40 in., and five and six inches of this precipitation has occurred in a single day. Alternating Arctic and equatorial currents, as are usual in these storms, have varied the temperature within 24 hours many degrees. Five or six inches of rain has at times fallen on 12 ft. of snow, threatening the inundation of the valleys below. A following Arctic current suddenly changed the temperature, freezing this melted mass into ice, making the use of snowplows impossible and forcing resort to pick and shovel upon the immense mass. A fall of dry snow has succeeded the rain and has been accompanied by high winds when the icy condition of the base on which it fell was most favorable to drifting. In many of the cuts and narrow ravines through which the road passes, in the mountain region these drifts reach the enormous depth of from 30 to 50 ft. and make the use of snowplows wholly out of the question, covering trains out of sight and disabling and blockading the shoveling forces. The relief forces have been frequently cut off from communication by rail with the base of supplies in the valleys below, and have had to be provisioned by men on snowshoes. Locomotives thus imprisoned have had to be supplied in some instances with fuel in the same manner."

The cities of Napa, Stockton, San Jose and Santa Cruz have been overflowed, the water running through some of their principal streets.

"We have been forced to employ 2,500 extra men at specially high rates of wages, owing to the dangers and difficulties of the service, and have had to provision them in the field by a snowshoe service at enormous expense. In places on the line of the Central Pacific the snow is from 150 to 200 ft. deep on top of the snowsheds, and a special force of carpenters is employed in strengthening them to prevent their being crushed. Other forces are attempting to relieve them by removing the snow.

"It began snowing along the entire line from Ogden to Colfax Dec. 20, and has continued with but unimportant interruptions since. The snowfall in the state of Nevada is the greatest ever observed by the pioneer population. The road has been kept open through Utah and Nevada to Reno, where the foot-hill elevation is first encountered coming westward, thence to the town of Truckee through the narrow cañon of the Truckee River. A winter almost Arctic in its character has raged for almost two months. From Reno to the summit the thermometer descended to 30 degrees below zero. At frequent intervals alternating changes of temperature softened the snow and converted it into solid ice barriers. The instrumentalities of defense have been augmented with the augmenting gravity of the situation, but the severity of the storm has constantly and surprisingly increased, and the difficulties of the situation have become more complicated, leaving the increase of instrumentalities still disproportionate to the obstructions offered by the storm."

The Railroad Gazette has received the following dispatch from General Superintendent Fillmore, dated Jan. 29:

"The storms we have had to contend with are unprecedented in the history of the road. The rotary plow has been doing most excellent work, and we should not have known what to do without it. It has been constantly at work day and night since the evening of the 19th, and yesterday afternoon, when working in 16 ft. of snow, broke down when we had only 300 ft. more to plough to open up the road. The heavy work we have had to do has fully demonstrated that the machine should have a much larger heating surface, and that the shovel of the plow should cut 8 in. wider on each side. It would then be perfection. The rotary that we borrowed from the Union Pacific to open the west end of Salt Lake division did the work in six hours that it would have taken 500 men to do in one week. The Cyclone plow has but just arrived and we have not had an opportunity to thoroughly test it."

An army of shovelers worked all night where the rotary failed, and it was expected to open the road on Thursday, letting through five cars of westbound mail, the first train through since the blockade. Two passengers died at Truckee, one of diphtheria, Monday, and one of gastric fever, Tuesday.

The blockade of the Union Pacific's Oregon line was very bad and lasted ten days or more. Eight trains were stuck at Baker City, Or., and the large number of passengers suffered a good deal of inconvenience, and even distress. A number of women and children were taken sick and three persons died, though it is not stated that their deaths were caused directly by bad weather or the detention. On Tuesday (28th), a Portland dispatch stated that the line was open and freight trains moving. The Southern Pacific line between California and Oregon has been completely blocked for two weeks, and still remains so. Passengers who left Portland, Or., for the South the 18th returned there on the 28th. The blockade of the railroads in the mountains of Colorado was quite extensive, but was in a region where such an event is not unusual. The snowfall there is reported at 13 ft. in many places.

The officials of the Northern Pacific are "exceedingly provoked" at the reports telegraphed regarding snow blockades along their road. The road was never freer from interruptions by snow, they say. The company has a sufficient number of rotary plows located along its line to have one at any given point within eight hours.

The cyclone plow, which has been standing at Minneapolis for some time, is now at work on the Central Pacific, having reached Reno a few days ago. In being taken there it was hauled over the Illinois Central, and when crossing a pile bridge near Sioux City it caused the piles to sink into the ground so that the track was unsafe until considerable repairs were made. It is said that the machine weighs 85 tons.

Around the World in 72 Days and 6 Hours.

A young woman, called "Nellie Bly," a reporter of the New York World, arrived in Jersey City by the Pennsylvania Railroad at 3:51 P. M., on Saturday last, having completed a trip around the world in 72 days, 6 hours and 11 minutes. She left New York Nov. 14, at 9:40 A. M., by the steamship Augusta Victoria, for Southampton; arrived there on the 22d at 2 A. M., and at London, by the fast mail train, at 5. She left London for Amiens, via Folkestone, at 8 A. M., for a visit to Jules Verne, who some twenty years ago wrote a romance in which the hero made a circuit of the globe in 80 days, though much of his imaginary trip was by slow conveyances. Miss Bly reached Calais so as to take the India mail (which

left London at 8 P. M. of the 22d) and arrived at Brindisi on the night of the 24th. She left there at 2 A. M. by the Peninsular & Oriental Steamship Line, and arrived at Ismailia, via the Suez Canal, on the 28th; left Aden Dec. 2 and arrived at Colombo, Ceylon, the 8th; Her next steamer was a day late, and she left there on the 10th, but arrived at Singapore Dec. 18, on time. Thence she went to Hong Kong and arrived on the evening of Dec. 24, a few hours ahead of time. Here it was necessary to stop until the 28th, and the next stage was to Yokohama. Arrived at Yokohama Jan. 2; left on the 7th, and reached San Francisco on the morning of the 21st, one day ahead of time. The Central Pacific being blocked by snow, Nellie started for New York via Mojave, leaving Oakland, opposite San Francisco, at 9:02 A. M. She reached The Needles at 4:30 the next morning, and thence took a special train over the Atlantic & Pacific and the Atchison, Topeka & Santa Fe; by which Chicago was reached at 8 o'clock on the morning of Jan. 24. From Chicago the trip was made by the regular train over the Chicago, St. Louis & Pittsburgh and the Pennsylvania, leaving at 10:30 A. M. and making schedule time throughout.

The train over the transcontinental route was the only special conveyance taken over any part of the journey. The time from Oakland to Chicago, 2,574 miles, was 69 hours, and from La Junta to Chicago, 1,030 miles, 24 hours and 12 minutes, an average of 42½ miles per hour. It is said that on this part of the road 120 miles were run in 118 minutes, and that the rate of 78.1 miles per hour was kept up for a very long distance. The route taken from San Francisco was over 23 miles longer than the direct overland line, and the time made was about 11 hours less than the fastest regular run by the short route.

This trip was made for sensational purposes, it being true, that—as Mark Twain said about Benjamin Franklin entering Philadelphia as a boy without shoes and a loaf of bread under his arm—almost any one could do it if he tried. In point of fact, no one cares to make a trip in specially quick time unless he is going somewhere. Nevertheless, this journey excited considerable interest, and mayors and other dignitaries honored the traveler with welcoming addresses. It will be seen that by taking special conveyances the trip might really be made in nearly a fortnight less time, as the stops at Hong Kong, Yokohama and elsewhere aggregate this amount. The aim at the outset was to complete the journey in 75 days, and this limit, as will be seen, was beaten by two days 17½ hours.

Miss Bisland, the woman sent westward from New York by the Cosmopolitan Magazine on the same day with Miss Bly, missed connections at one or two points, and was compelled to take a slow steamer from Queenstown, Jan. 19, so that she will be probably 79 or 80 days in making the circuit of the globe.

TECHNICAL.

Locomotive Building.

The Baltimore & Ohio has recently purchased six locomotives and put them in service on its lines. Two of the locomotives were bought of the Baldwin Locomotive Works, three of the Taunton Locomotive Works Mfg. Co. and one of the Mason Machine Works of Taunton, Mass. Three of the engines purchased of the two latter firms are passenger locomotives with 18 × 24 in. cylinders.

The Schenectady Locomotive Works have finished the last engine of an order for 15 received from the Illinois Central. Six were 10-wheel passenger engines, with cylinders 19 × 27 in. and 58-in. boilers. The drivers are 64½ in. high, and the weight on the drivers is 96,300 lbs., with a total weight of 123,500 lbs. Nine of the engines were moguls, with cylinders 18 × 24 in. and boilers 54 in. The drivers are 55 in. in diameter. The weight on the drivers is 84,000 lbs., and the total weight amounts to 98,000 lbs.

The New York Central & Hudson River road has placed an order with the Schenectady Locomotive Works for twelve very large passenger engines for fast trains. They will have 19 × 24 in. cylinders and 5 ft. 10 in. drivers, with fire boxes 8 ft. long and 58-in. boilers, so equipped that the engines may be compounded with but little additional expense. They will weigh 115,000 lbs., and delivery will commence March 1.

The Missouri, Kansas & Texas has placed in service within the last week 10 new engines recently completed for it.

The Silverton road has recently purchased two heavy engines for use on its steep grades.

The third of five engines for the Pennsylvania lines was turned out of the Columbus shops last week. The last of the five will be completed Feb. 10, after which the construction of five more of the same class of engines will be begun.

The Louisville & Nashville has placed an order with the Rhode Island Locomotive Works for a number of engines, in addition to the 10 consolidation locomotives being built by the Rogers Locomotive Works.

Car Notes.

The New York, Susquehanna & Western has issued specifications for four passenger and two combination passenger and smoking cars. The contract will be probably awarded in a week.

The contract has been awarded to the Gilbert Car Manufacturing Co., of Troy, N. Y., for four summer excursion cars for the Boston, Winthrop & Shore road, which is controlled by the Boston, Revere Beach & Lynn. These cars will be fitted with rattan upholstered seats and will have seating capacity for 64 persons.

The Illinois Central is asking bids on 25 passenger cars.

The Wason Mfg. Co., of Springfield, Mass., is busy upon 10 more cars for the Old Colony and Maine Central,

and has orders also from the Boston and New York shore line and the Cheshire road.

The Northern Pacific will probably soon place orders for 25 passenger coaches, 10 baggage cars and 300 platform cars.

The contracts for 1,200 gondola cars for the Pennsylvania lines have been awarded by Edward B. Wall, Superintendent of Motive Power of the Southwestern system, as follows: Erie Car Works, Erie, Pa., 500 hopper bottom; United States Rolling Stock Co., Hegewish, Ill., 500; and Lima, O., shops of the Lafayette Car Works, 200.

The Toledo, Columbus & Cincinnati has placed in service 50 new flat oil tank cars and marked Lima Oil Co.

The Chicago & Alton is building at its shops at Bloomington, Ill., the cars for four new through passenger trains, which are soon to be put in service between Chicago and Denver.

The Norfolk & Western has given an order to the Roanoke Machine Works for 15 passenger cars.

The Steel Tubular Car Co. has opened books for subscriptions to its capital stock, at the St. James Hotel, Bradford, Pa., and \$30,000 has been subscribed at that place. The company proposes to erect buildings in the Tuna Valley between Bradford and the New York State line, to build a steel tubular car patented by J. W. Post. Alonzo I. Wilcox, of Bradford, is Managing Director of the company.

The South Baltimore Car Works have received an order for 200 box and 250 coal cars for the Baltimore & Ohio Southwestern. Another installment of the 250 drop-bottom gondola cars ordered by the West Virginia Central has been delivered. A new order for cars has also been received from the Wilmington & Northern. Since Jan. 1, 62 cars have been delivered to the Atlantic Coast Line by the company. At the annual meeting of the directors, held last week, the board declared a six per cent. dividend for 1889, payable Feb. 15.

Bridge Notes.

H. B. Fairwell, County Surveyor, St. Joseph, Mo., will receive bids until Feb. 8 for the following four iron bridges: Over Williams' Branch, section 35, township 55, range 35, near Platte County line; length 60 ft., two 20 ft. approaches, roadway 14 ft. On Dishon Road, section 26, township 57, range 35; length 40 ft., two 12-foot approaches, roadway 14 ft. On Stewartville road, section 23, township 59, range 35; length 50 ft., roadway 14 ft. South of Rising Sun school house, section 29, township 55, range 33.

M. P. McReynolds will receive proposals for the construction of a one span iron bridge, about 100 ft. long, at Morrilton, Ark.

The Nashville, Chattanooga & St. Louis is erecting an iron bridge over Turnbull Creek, near Kingston Springs, Tenn. Work will soon begin on the Stone River bridge on the Lebanon branch.

The County Commissioners of Lewis & Clark County, Mont., will on Feb. 4 let the contract for the erection of a bridge over Ten Mile Creek near Helena.

The County Clerk of Lavaca County, Tex., will receive proposals at Hallettsville until Feb. 10 for constructing an iron bridge across Rocky Creek.

The County Commissioners of Lauderdale County, Ala., have advertised for bids on an iron bridge across Cypress Creek, immediately west of Florence. The bridge is to be 180 ft. long, with a 16 ft. causeway. Bids will be opened at Florence, Feb. 10.

The Pittsburgh Bridge Company has the contract to build an iron bridge across the South fork of the Kentucky River at Booneville, Ky.

The trestlework across Young's Bay, at Astoria, Wash., has been awarded to Hoffman & Bates, of Portland, Ore., and they have already begun work on the pile driving at Smith's Point.

The Board of Street Opening in New York City has granted permission to the Central of New Jersey, and the Pennsylvania road, to construct two iron bridges across West street, at the foot of Liberty and Cortlandt streets, for foot passengers.

The Commissioners of the District of Columbia have been petitioned to join in a project to bridge the Eastern Branch of the Potomac River, at Washington, D. C. Congress will be asked to appropriate the necessary amount.

The Louisville, Evansville & St. Louis this week placed in position a steel bridge over Crooked Creek at Centralia, Ill. The bridge has a span of 80 ft.

The Virginia & Maryland Bridge Co. has been recently organized to build a bridge over the Potomac River at Shepherdstown, Md. There the bridge will be 615 ft. long and have four spans.

A new bridge 1,170 ft. long across the Connecticut river between Middletown and Portland, Conn., is proposed.

A bill has been introduced in the legislature at Richmond, Va., to incorporate the Berlin & Lovettsville Bridge Co., with Daniel Baker, Jr., D. H. Hargett, R. H. Gibbs and J. B. McCabe as incorporators to build a bridge across the Potomac at Lovettsville.

The Park Board of New York City has approved a new bridge over the Harlem River at Seventh avenue and One Hundred and Fifty-fifth street, to connect with the proposed McCombs' Dam Viaduct, but recommended that the bridge be constructed under the supervision of the Department of Public Works. It is proposed to issue \$500,000 of new bonds to pay for the improvement.

A bill has been introduced in the United States Senate to authorize the construction of a bridge at New York City across the Hudson River to New Jersey. It provides that 15 persons, forming a corporation to be known as the North River Bridge Co., shall build and maintain the bridge; that it shall have not less than six railroad tracks, to be constructed with a single span, and must be completed within seven years.

A bill has also been introduced in the Senate providing for the construction of a bridge over the Delaware River from Philadelphia to Camden, N. J., by the Philadelphia & Camden Bridge Co. The incorporators are James Pollock, Thomas S. Speakman, Simon Cameron, W. Allen and J. B. Hodgkins. The capital stock is \$2,000,000 with privilege to increase.

The Charleston & South Side Bridge Co. has applied to the Virginia Legislature for a charter to construct a bridge over the Kanawha River, at an estimated cost, including terminals, of \$400,000.

The city council of Burlington, Ia., has been asked to order a special election, to vote on a proposition to levy a five per cent. tax on all city property, to aid in build-

ing the combined highway and railroad bridge across the Mississippi River, referred to last week. Philip M. Crapo, of Burlington, is President of the Burlington & Illinois Bridge Co., which proposes to erect the bridge.

The Keystone Bridge Co., of Pittsburgh, has been awarded the contract to construct three and a half miles of double-track elevated railroad in Chicago. It will require 8,000 tons of iron work to build it.

The Norfolk & Western has commenced erecting the iron work for a plate girder bridge over the New River at Foster Falls, Va. The bridge is 298 ft. long.

The Vermont Construction Co., of St. Albans, Vt., has secured the contract to build the draw span of the new Grand Isle bridge for \$5,000.

The Milwaukee Bridge & Iron Works has been awarded the contract for building a steel viaduct long across the Menominee Valley at Wauwatosa, Wis., for a street railroad. The contract price is \$75,000.

J. H. Pearson, Nicholasville, Ky., Chief Engineer of the Richmond, Nicholasville, Irvine & Beattyville road will receive bids, until Feb. 15, for seven bridges, having combination truss spans, with iron or steel floor beams. Of these bridges there is one of 180 ft. span, two of 150 ft., three of 100 ft. and one of 80 ft. Proposals will soon be asked for erecting an iron and steel viaduct crossing the Kentucky River at Irvine. There will be a channel span of 250 ft., and eight spans of 100 ft. and 210 ft. of viaduct.

Mr. Grant Wilkins, Engineer and Contractor of Atlanta, Ga., has contracted for the following work: Ocean Steamship Co. lumber wharfs, at Savannah, 75 ft. x 1,000 ft. long; Flint River Bridge, Macon & Birmingham, two spans of 150 ft. each, and the substructure work consisting of three brick piers; Chattoochee River bridge for Central of Georgia, at Columbus, Ga., of six spans = 740 ft.; Kitchafonee bridge, of Central of Georgia, of two spans 230 ft. long. The iron for this work will be made by the Passaic Rolling Mills of Paterson, N. J.

Manufacturing and Business.

Greenlee Bros. & Co., manufacturers of special wood-working machinery, have largely added to their capacity, and report that they have recently sold hollow chisel mortising machines to the Ohio & Mississippi for its Washington, Ind., shops; Armour Packing Co., Kansas City Mo.; Barney & Smith Manufacturing Co., Dayton, Ohio; Atlantic Coast Line for two shops; and to the Pennsylvania for its Pavonia, N. J., shops.

Riehle Brothers, proprietors of the Philadelphia Scale & Testing Machine Works, report the following recent orders among others for scales and testing machines: one 75-ton Riehle self-adjusting railroad track scale with rocking bearing for the Baldwin Locomotive Works, Philadelphia, and one of 90 tons capacity for the Lehigh Valley road at Perth Amboy, N. J.; two extra heavy rolling mill scales, Oxford Iron and Nail Co., Oxford, N. J.; two warehouse scales, for the Tennessee Coal, Iron & Railroad Co., South Pittsburgh, Tenn.; one pig metal truck, Antrim Iron Co., Mancelona, Mich.; one steam power rope twister, Anniston Pipe Works, Anniston, Ala.

The National Forge & Iron Co. has nearly completed its large department at East Chicago, Ind., and it expects to soon put it in operation and begin work on contracts for car axles and forgings. The rolling mill is working to its full capacity. The office of the company is at 551 State street, Chicago.

The recently organized firm of Coolbaugh, McMunn & Pomeroy comprises Messrs. F. W. Coolbaugh, S. W. McMunn and L. R. Pomeroy. The names of these gentlemen are so well known to the railroad public that they need no further introduction. They will act as special sales agents for Carnegie, Phipps & Co., Ltd., as general sales agents for the Boies steel wheel and as general Eastern agents for the Frost, dry carburetter system of lighting. They propose to give particular attention to the introduction of the railroad material manufactured by Carnegie, Phipps & Co.

One of the best arranged foundries in the West is that of the Link Belt Machinery Co., near Chicago. It is a well-lighted structure, with a large monitor, under which travels one of the Morgan Engineering Works power cranes. The shafting in the shop is driven by hemp rope from a stationary engine. The molding machines are operated by hydraulics, and a hydraulic elevator hoists all material to the cupola stage. A separate storehouse, of fireproof construction, with shelves arranged for patterns, has been erected in the yard adjoining the foundry.

The Chicago Forge & Bolt Co., at Thirty-ninth street, Chicago, is busy with orders for various kinds of railroad iron work, including bridges, turn-tables, axles, and trestle work. The company has acquired the right to make the "straight fibre" axle, and a number are under way at the present time. A three-high mill for rolling small iron will soon be put in. One of the heating furnaces is heated by gas made in the same furnace, and works satisfactorily. One of the specialties of this company is a turn-table which is easily adjusted and simply constructed, several of which are in use on the Illinois Central.

The Metropolitan Electric Light Co. operates a number of large central stations in the city of London. One was recently equipped with an outfit of seven Westinghouse compound engines, as follows: Four 14 in. and 24 in. x 14 in., two 10 in. and 18 in. x 10 in., and one 12 in. and 20 in. x 12 in. Four additional Westinghouse compounds have been ordered from Pittsburgh for the same station. The largest has cylinders 18 in. and 30 in. x 16 in.

Iron and Steel.

The Springfield Iron Co., of Springfield, Ill., has added a new 12-in. guide mill, equipped with a Siemens heating furnace, to its plant, which made 807 tons of finished iron last month.

The Crescent Steel Co., of Pittsburgh, has recently built a new 18-in. plate mill, to be used for rolling down slabs and finishing them off in thin sheets.

The Syracuse Iron Works property, which has been in litigation since 1884, was sold Jan. 24 on a judgment in favor of the holders of \$56,000 worth of the bonds of the assigned company. Charles B. Everson, of Syracuse, N. Y., bought the rolling mill for \$23,300. The rolling mill will probably be started as a merchant iron mill.

The Illinois Steel Co. has adopted the Massick & Crooke type of fire-brick hot-blast stoves for the four new blast furnaces which it is erecting at the South Chicago works. The mills of the company in Joliet, with one exception, have been closed for a month for the annual repairs, and have been waiting the adjustment of wages,

It is said that the scale agreed on for the ensuing year makes an aggregate advance of 15 to 18 per cent. on the rates of last year. The mills will probably resume operations Feb. 1 with about 1,500 men.

The new works of the Piqua Rolling Mill Co., at Piqua, Ohio, are now well under way in all departments on iron and steel sheets. The fuel used is natural gas, exclusively. The products of this mill are taken exclusively by the Cincinnati Corrugating Co., and are used by it in its roofing trade.

At the recent annual meeting of the stockholders of the Ellis & Lessig Steel & Iron Co., Limited, of Pottstown, Pa., George B. Lessig was elected President, William S. Ellis, Treasurer, and J. B. Lessig, Secretary.

Work was commenced last week on the construction of another welding furnace at the plant of the Duquesne Tube Works Co., at Duquesne, Pa. The company has one furnace at work on steel boiler tubes, and though running double time, is unable to keep up with orders.

Cartwright, McCurdy & Co., of Youngstown, Ohio, have purchased the rolling mill of the Pomeroy Iron Co., at Pomeroy, Ohio, which has a capacity of 80 tons of finished iron per day and gives employment to about 250 men when in operation.

J. P. Witherow & Co., of Pittsburgh, have received contract to build a furnace at Florence, Ala., for the Florence Iron Co.

The Rail Market.

Steel Rails.—Quotations in the East are generally \$36, though \$35 and \$35.50 has been quoted by a few mills. At Pittsburgh \$35@36 cash at mill is quoted, and at Chicago \$38 is asked.

The Quick-Action Freight Brake.

The Lehigh Valley Railroad is about to apply the Westinghouse quick-action freight brake to 2,500 of its freight cars. One important feature of this order is the fact that it is from an Eastern road. Heretofore the larger percentage of air brakes have been applied to the equipment of roads west of the Mississippi River; although the Pennsylvania lines east and west of Pittsburgh have about 10,000 cars fitted with air brakes.

The Van Dorston Coupler.

The Van Dorston Cushioned Car Coupling Equipment Co., of Philadelphia, has been advised by the Philadelphia & Reading of the adoption of its coupler by that company, and it has received an order for 8,000 couplers of the cushioned type for the cars of the road. These couplers will be placed on 4,000 new cars now being built for the Philadelphia & Reading by the Pullman Car Co. at Pullman, Ill.

Works of the Bethlehem Iron Company.

In the recent issue of the *Proceedings* of the United States Naval Institute, Mr. W. H. Jaques describes these works at some length. Less than three years ago, the Bethlehem Iron Company broke ground for the erection of complete hydraulic forging machinery for the manufacture of the largest guns and the heaviest shafting and armor plates. As is well known, the company already had an extensive plant and was producing a large amount of material of high class, especially rails. The blast furnaces have a total capacity of 100,000 tons. The ordnance and armor plate department is now in operation, and when completed will contain hydraulic forging presses capable of producing the largest forgings required for ships and guns, pneumatic and hydraulic cranes of from 25 to 150 tons capacity, and the necessary furnaces and annealing shops, machine shops, etc. The shops are lighted by electricity.

The casting and forging presses were made by Sir Joseph Whitworth & Co., Manchester, England, from designs by Mr. Gledhill of that firm. The heavy tools were constructed by Mr. Gledhill and Mr. Fritz. The designs of the hammer plant have been modified from plans from Schneider & Co., of Creusot. It is expected that within a year the department for the production of heavy forgings for guns, armor plates, shafting and other purposes will be completed, and will equal, if not surpass, any other establishment of its kind in the world.

An Electric Snow Sweeper.

The electrically driven snow sweeper in use on the West End Street Railway in Boston consists of a platform car, mounted on a four-wheel truck, two Thomson-Houston motors of 15 horse power each, being attached to the axles. Underneath each end of the car is a large cylindrical brush made of rattan, set at an angle of about 45 degrees and reaching across the track. The brushes are revolved very rapidly by power from a 15 horse power electric motor which is on the platform of the car. The sweepers are propelled precisely the same as the electric cars, the long pole reaching the trolley wire being fixed to a post on the platform.

Power for Isolated Machines.

The following note is condensed from a recent article in the *Iron Age*: It seems to be the tendency at the present time to provide each machine with an individual or independent power for driving. The methods may be divided into steam, air and electricity. When power is solely for the propulsion of one machine it is quite under the control of the operator using that machine. This does away with expense, constructive and operative, connected with shafting and reduces materially the wear and tear. The machine is used only when needed, and all expense ceases when the machine stops. Compressed air has been considerably used in Paris. The advantages derived from its use are not equal to the disadvantages from the necessary piping peculiar to the machine itself and the deficiency in the power obtained. The electric motor, as a self-regulating machine, is beyond all doubt superior to any other machine in the market for the generation of power. It will transmit 92 to 93 per cent. of the work in the current delivered to it. Again, it requires no attendance except occasional oiling; wear and tear is reduced to journal wearing, and it requires no piping to carry away hurtful gases. In point of regulation it is as effective as the best steam-engine governor. As now built it is guaranteed to run within two per cent. of the speed regulation provided by the contract. The good points of the electric motor are not appreciated as they should be, and it would be more extensively used if its driving shaft were reduced in speed. The mechanic looks with suspicion upon a speed of 1,500 revolutions a minute. Another feature which acts against the introduction of the electric motor is the first cost. Considering the horse power derived from it and the cost of construction, this is unnecessarily high. What we want is a low speed, moderate cost, electric motor.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

Elsewhere in this issue will be found a discussion on the matter of washing out locomotive boilers immediately after the fires are drawn, particularly when they are equipped with fire-brick arches. The discussion shows conclusively the almost universal experience that fire-brick arches retain heat for a great and inconvenient length of time; consequently when the water is withdrawn from the boiler immediately after the fires are drawn, there is great liability of burning and cracking the fire-box sheets. In our issue of Jan. 10 appeared an editorial calling attention to this matter, and the discussion at the Western Club corroborates the statements made then. One of the speakers showed the difficulties in connection with the fire-brick arch more conclusively than any of the others when he stated that on his road in the summer season, when they had plenty of engines, they used a fire-brick arch, but in the winter season, when they were short of engines, they were compelled to remove the arches because they could not wash out the engines fast enough to keep up with the demand from the transportation. Those who have been proposing to increase the fuel economy of locomotives by the use of fire-brick linings will find something in the discussion published to-day which will set them to thinking.

The discussion on ventilation of passenger cars, which appears in another column, serves rather to reveal the difficulties which stand in the way of better ventilation than to advance the practice. We report it but briefly, principally because it did not "get anywhere." Some of the most intelligent speakers cast doubts upon the actual call for better ventilation, while there was no agreement as to the practicability of any of the methods presented; and even the time-honored principle employed with the Spear heater, the Mann system, and now, on the Chicago, Milwaukee & St. Paul and other roads, with steam heating, was said by competent observers to be quite inefficient. Certainly we have often found it so. The great lesson from the discussion is that there has not yet developed a strong public demand for good ventilation. If there were such a demand the mechanical departments of the railroads would take up the question vigorously and soon settle what can and what cannot be done. So long as the traveling public prefers handsome interiors to fresh air the railroads will give it what it most wants. There is something to be said on the other side, however. The public has never had a chance to show its appreciation of well-ventilated cars in the really effective way—that is, by patronizing those cars in preference to others. One of the speakers in the discussion referred to asks what traveling man selects routes because they run cars provided with special ventilating apparatus? The fact is, no railroad has yet got up a name for good ventilation. Supposing some of them try it and see what the effect will be on competitive traffic. A very sensible suggestion made was that cars be provided with double

sashes and good thermometers, and that operating officers see that trainmen are instructed to make rational use of such means of heating and ventilation as they now have.

The United States Senate Committee which is investigating the beef trade was surprised to find the roads paying mileage on dressed beef cars owned by outside parties and not on cattle cars. The reason given by the railroad men was the true one. They have abolished mileage on private cattle cars because they could; they have not done the same in the dressed beef business, because they could not. In general it is, of course, better for a road to own its cars. As a matter of railroad economy they can be utilized for back-loads, and kept more constantly in service. As a matter of public policy, a road can serve different shippers far more fairly in cars of its own than by those of outsiders. But the law against pooling prevents railroads from taking advantage of either of these things, and thereby stands in the way of the public advantage also. The dressed-beef men are organized; the railroad men are not allowed to defend themselves by a similar organization. The dressed beef shippers would have it in their power to force the road which built dressed beef cars of its own to let them lie idle. In other words, it could divert all traffic from that road until the company should make terms with the ring of shippers. Somewhat the same results have been seen in the oil business, and are likely to occur in any industry which is thoroughly organized and requires special forms of transportation. On the other hand, the cattle men are not organized, or at least not nearly so well. The result is that the railroads are enabled to do this business in a way which is thoroughly right in itself, but which does not look relatively fair as compared with the dressed-beef men. The result of the prohibition of pools is to enable a monopolized industry to dictate terms to the railroads in such fashion as to do harm, in varying degrees, to the railroads themselves, to outsiders who wish to go into the business, and to people who engage in other similar lines of business which do not enjoy the same completeness of organization.

A movement is on foot in at least one of the local railroad clubs, and that the most active of them, to withhold the discussions from publication until the speakers have an opportunity to revise their remarks. It is even proposed not to give out the discussions for publication by the technical papers until they have been printed in a pamphlet published by the club. This last proposition is made as a means of increasing the revenues of the club. It will probably fail. The club will find that a publishing business, like any other business, cannot run itself very long, and is subject to commercial laws. We have known many clubs and other bodies that have tried to make a little money by publishing something and getting folks to advertise, but they very seldom succeed. Why they do not it is not worth while to stop to discuss. A little reflection will suggest to any business man a good many reasons. Still the club in question may succeed in such an enterprise, and if it does not a little experience will not cost it much. The other proposition, to hold the reports of discussions for revision, we approve of heartily. It would be a relief to the technical editors, and would raise the quality of the scientific journals, if this were universally done in technical clubs. We feel sure that it would also increase the standing and value of the clubs. The material, when turned in for publication, would almost invariably be better reasoned and better expressed, after revision by the speaker. This in itself would be a great gain to the clubs and to the readers of the journals. Again, editors would have time for more satisfactory treatment of the reports, either in the way of condensation or comment. Some gain would be found in this; how much would depend on the quality of the editorial work. We can conceive that there would sometimes be a loss. A still further advantage would be found, we think, in the variety of the discussions. Probably more men would take part. Few men have the gift of compact, logical speaking to such a degree that their extemporaneous discussions of scientific matters make good scientific reading. Still fewer of the men whose lives are passed as are the lives of engineers and railroad officers have much confidence in their ability to do such talking. Consequently the discussions in the local railroad clubs are ordinarily confined to a few men, frequent attendants at the meetings, who feel responsible for keeping the thing going, and do their duty even when they know they have little to say; and to those who are fluent and cheeky and like to talk. But many a man who is loaded with good experience and good ideas sits silent because he is unwilling that

his halting remarks should go broadcast over the world just as they leave his lips, or, what is worse, just as an ignorant stenographer takes them down. He knows that "the sped arrow, the spoken word and the lost opportunity return not." It is suggested that unless the club meetings were "executive sessions," and outsiders excluded, reports of their proceedings would be published from notes taken by reporters or others. No trouble would, we think, arise in this way. Any editor would respect the wish of the clubs, and the secretaries could prepare such reports as they cared to have appear in advance of the regular publication.

In continuation of what we said two weeks ago on the subject of car couplers of the M. C. B. type, it should be added that the necessity for inspection does not alone apply to the character of the material, or the strength of the design, but also to the dimensions and the contour. Very lately a lot of couplers was sent out as standards which would not couple with each other on a straight track. Some of them would couple and some of them would not, showing no uniformity in product and no inadequate inspection by the makers. The result of such carelessness as this is to educate railroads to the necessity for an inspection of their own, which is of undoubted value to the railroads themselves; and while it may be hard on those makers who do not have a system of inspection, yet in the end will prove advantageous to them also. The attitude of the railroad companies toward the vertical plane coupler is a critical one, even where they are adopting it, for as in other cases in which large sums of money will be expended, they are willing to pay for careful examination rather than to trust to luck and representations and risk the consequences.

A train accident at Carmel, Ind., on Monday last, reported in another column, was worse than that near Cincinnati on the 17th. The cause or causes are apparently of that class which can be justly estimated only after a careful inquiry. The horrible work of the fire and the lessons concerning continuous heating are clear in both cases, but beyond that any discussion of what should be done to prevent similar disasters in the future must be carried on in the dark until a full statement of the facts is given. At Cincinnati the proper procedure in selecting and instructing persons for block-signal operators seems to be the point to be emphasized. As every one knows, this is a question of administration which needs attention at all times and on all roads. It involves the rate of wages and tenure of position of employes and the qualifications of the superintendent; for it is a fact that the most successful roads have, in the long run, generally paid better wages, have employed other means to make good men contented, and have superintendents who are better judges of men, practically, than is the rule with roads on which "accidents" are more frequent. We say "practically," because there are bright, intelligent, and far-sighted officers on poor roads. The men are all right, but their surroundings hamper them so that their talents are neutralized. Nothing is more certain than that the penuriousness or carelessness of directors is reflected in the accident record. No bridge should be built without a strong floor, with guard rails. Every one knows this. But we are not sure whether the Carmel disaster gives point to this or not, as there is no evidence as to where the derailed cars struck the bridge. A section master who repairs track and goes off leaving it insecure is not fit for his place, but we do not suppose the practice of the Louisville, New Albany & Chicago in selecting and disciplining its track repairers can be fairly criticised until an impartial tribunal has got at some facts in the matter. These and kindred considerations show the great necessity, from a public standpoint, for such an impartial tribunal. England has one. American railroads should welcome one, for the frequent horrible accidents disgrace American management in the eyes of all good judges, whatever may be said of the verdict of our careless "public opinion." Moreover, the fact that your road has a record better than others is not so great a protection as it seems, for people judge of the railroads of the country as a whole much more than they ought, and their opinions are biased by this fact in spite of anything that can be done to prevent such an unjust estimate.

The subject of the use of pressed steel and malleable iron in car construction was brought up incidentally at the last meeting of the Western Railway Club, but because of its importance it was referred to another meeting, to give an opportunity for preparation to those who might like to speak on the subject. Mr. E. M. W. Hughes, representative of the Fox Solid Pressed Steel Co., was invited to prepare a paper on the uses of pressed steel, and to state as nearly as possible the

comparative weights and strength of the different parts which his company manufactures for railroad equipment. No more important or advantageous innovation in the construction of rolling stock has been brought forward for a long time, and there is no reason why railroad men should not favor the introduction of this class of material, for the advantage is all on their side. Such construction gives not only increased strength, and an enormously increased life to details of equipment, but also decreases the dead weight in amounts varying from 10 to 50 per cent. with an average of about 20 per cent.; the advantage of which is too well appreciated by those who are in the business of transportation to need further illustration here. The readiness with which some of the devices in pressed steel, such as centre plates, corner plates, and stake pockets for cars, cylinder head casings, dome casings, and other light work for locomotives, are taken by some of the Western roads which are anxious to decrease weight and increase durability, indicates the field for the use of sheet metal in the construction of minor details. Nearly all of the companies manufacturing pressed steel work, including the large new works of the Fox Solid Pressed Steel Co., already have their books filled with orders representing many different customers. It is to be regretted that we have not been able to adopt more standards in car and locomotive construction before the large use of pressed steel began, and it is to be hoped that locomotive builders, car builders, and railroad men generally will readily concur in any serious effort to reduce dimensions to standards, and will be willing, as far as possible, to use pressed steel parts which differ only slightly from their standard sizes in order to reduce the number of dies necessary, and so encourage the introduction of a most important and desirable system of manufacture, the value of which will surely increase as its use extends.

The notion that a power brake on freight trains is more of a luxury than a necessity is doubtless still held by more people than it ought to be. Many a railroad director votes for an expenditure for an appliance of this sort, if he votes for it at all, not because he vividly realizes that he is thereby putting money in his own pocket, but because the general manager has, by energetic persuasiveness, succeeded for the time being in overshadowing other demands, or because a vague sense of the temper of public sentiment has made it seem politic to make a concession to employees or to patrons even at a sacrifice of financial economy. These motives are all right, and it is to be hoped that the arguments of general managers, the wishes of passengers, and the interests of trainmen will receive an increasing share of attention and respect; but it really should not be necessary to wait for short-sighted directors to attain to that high standard. What with the natural narrowness which they and all the rest of us have, the insurmountable fact that most of them give 99 per cent. of their time and thought to other interests, and, therefore, cannot in the nature of things be made to consider very deeply the needs of the railroad property they own, it takes time and much tedious work to change a director's point of view. But there is an argument for air brakes which will appeal even to those whose only sensibilities are those connected with the pocket nerve. It is that it pays immediately. With the requisite data it could doubtless be proved that \$25,000 expended in this way would be morally certain to save that amount within a short time, if the brakes were used. The problem of getting other roads to take concurrent action, so that borrowed cars will not interfere with the use of power brakes on one's own, is a difficult one, but there is no more rational way of solving it than to hammer away at this simple argument. Persistent work in this direction may materially hasten the time when the equipping of cars shall become general. These reflections are merely prefatory to a statement, which we take from a late Duluth paper, that the Chicago & Northwestern is now equipping its 20-ton ore cars which run between the Gogebic mines and Escanaba. Long trains are the rule on the ore roads of the Lake Superior region, because the heaviest traffic is taken down grade; and train accidents, when they occur, are likely to be bad ones. That such have been by no means infrequent will be no news to readers who have read the accident records in these columns. With 20-ton cars the necessity of air brakes is, perhaps, obvious; with steep grades it should be equally clear, and with high speeds it is already recognized. Where all these elements are combined the argument is overwhelming, and a road situated as the Northwestern is here doubtless needs no urging. But the duty of superintendents generally is to collect the data and perfect their proofs and their reasoning, so that they

can show with force the bearing of these same considerations where the evidence is more obscure. Air brakes in the case cited will pay for themselves in, we will say for a rough guess, three years. In other circumstances this time might be five years, or even 10, but the result is no less certain because more distant. All railroad officers having facts available to elucidate questions of this kind should "put them where they will do the most good."

Fundamental Factors in the Rate Situation.

Every country with a complicated railroad system has two kinds of rates. There are local rates, arranged pretty nearly on a mileage basis, and there are through rates for long-distance shipments, whose amount is determined by competition, directly or indirectly. If this system is carried out, traffic takes local rates to an interior trade centre like Chicago or St. Paul, and thence receives through rates to its market, whether it be New York, Philadelphia, or Liverpool. The aggregate amount of charge between the original point of shipment and the final market is largely determined by general business conditions, independent of the railroads themselves. The difference between the market price of wheat in Liverpool and the cost of production in Dakota places the limit beyond which aggregate wheat rates cannot go. But the division of the total rate into its local and through parts is, or seems to be, more under the control of the railroad managers. This division determines the location of internal trade centres. Goods will be shipped at local rates, under distance tariffs, for as short a space as possible, and shippers will strive to take advantage of the low through rates from the nearest available point. A very slight difference of policy with regard to rates will make a great difference in determining which point is most available, and will build up one trade centre at the expense of another.

The hardship is most severely felt in periods of change. If one place has a permanent advantage over another, business adjusts itself to the difference, however arbitrary it may at first have seemed. The favored points get larger traffic and have higher land values; but as between different persons who are not landowners, matters tend to become equalized. The advantage in rates at the favored spot is counterbalanced by a disadvantage in rents or in accommodations. But when any change takes place in the relative position of affairs, the readjustment is attended with a fierce conflict of individual as well as local interests.

Two sets of causes, one natural and the other artificial, have given force to this difficulty just at present. The natural causes are the growth of the West and the development of transportation via Lake Superior. The artificial causes are mostly connected with the Interstate Commerce Law. The natural conditions are favoring St. Paul or Minneapolis as against Chicago in competing for the traffic of newly developed districts. The law, by rendering direct shipments cheaper, has rendered it harder for the intermediate trade centres to insist on rehandling the traffic of their own districts.

In 1881 Chicago formed the natural starting point of trunk line rates. It was the initial point for nearly one-tenth of the through shipments. St. Louis and Buffalo each furnished one-third as much as Chicago; other points decidedly less. The conditions of lake competition primarily determined Chicago rates. Taking these as a basis, the rates from other points could be adjusted in a relatively fair fashion.

To-day all this is changed. The Chicago adjustment no longer rules everything else. The lake routes to St. Paul form a mode of transit not much more expensive than that to Chicago, and, in proportion to the distance, much less expensive. If points beyond St. Paul are to send goods to Chicago for handling, one of two things must happen: either the routes from St. Paul to Chicago must take an extremely low rate—their *pro rata* share of a through rate fixed by lake competition—or else the roads of initial shipment must content themselves with less profits on goods destined for Chicago than on those for St. Paul. The Iowa roads cannot accept the former alternative; the Dakota roads naturally do not quite like the latter.

The various methods proposed to meet the difficulty are none of them wholly satisfactory. The system of milling in transit lessens the intensity of the trouble by allowing the physical rehandling to take place at one point and the commercial rehandling at another. But this is at best a mere palliative; and, as is shown by the present experience of St. Louis and Kansas City, it does not admit of development in such a way as to be really fair to both places. Still less satisfactory is the outcome of the efforts of the railroads to keep up the rates from the more distant points. The conference concerning St. Paul rates has failed of its object, be-

cause the lines from St. Paul to Duluth will not agree to high through rates. In fact, they cannot. The distance from St. Paul to Duluth is so short that any attempt on the part of these lines to dictate what rates shall be paid on Lake Superior traffic would almost necessarily fail.

The Interstate Commerce Law makes matters still worse for the intermediate trade centre. If the through rate from St. Paul to New York fixes a maximum for the rates from intermediate points, the difference between the St. Paul-New York rate and the Chicago-New York rate limits the local rates which can be paid on goods to be rebilled from Chicago. The moment a distance tariff from Chicago on local freights exceeds this slight difference on through freights, there will be an effort to bill goods direct. If the local point is large enough to furnish goods by the carload, this effort will probably be successful. This is perhaps the most conspicuous advantage among the many now enjoyed by the remote points of trade shipment. The railroads serving these points have their hands free to make high through rates from local stations beyond unhampered by the short-haul clause. The area from which such a centre can collect goods at local (distance) tariffs is thus comparatively wide. But at the intermediate trade centres the short-haul clause makes the direct rates lower, and restricts the area from which the collecting point can be supplied.

"The end of all these things no man knoweth." It has become clear that through lines of railroad must act as a unit. The conflicting interest of roads east and west of St. Paul, whether on transit or mileage, must not be allowed to inure to the disadvantage of both sets of railroads. The lease of the Wisconsin Central to the Northern Pacific meets a clear necessity of the situation. It is obvious that the railroads cannot get along without something of the kind. We only wish it were equally obvious what to do next.

The Michigan Central Compound.

The compound locomotive illustrated in this issue is the first two-cylinder compound for regular heavy work that has been built in this country. Its operation has been very satisfactory at the ordinary speeds. It starts trains even better than the non-compound ten-wheelers of the same type which are in regular service on the Michigan Central. On a level tangent, with a train of 48 loaded cars, this engine will get up a speed of 20 miles an hour in 3,000 ft. from the start. Our readers will remember that during last summer it was stoutly contended by many that compound locomotives would not start trains satisfactorily. It is pleasing to note that the action of this engine indicates that the position taken by the *Railroad Gazette* in the discussion was exactly correct.

Those who take an interest in the compound locomotive and its development in this country will watch carefully the operation of this first two-cylinder, double-expansion engine, because it has been constructed in a manner, and will be operated under conditions, that will give the compound construction a fair trial, and the tests are being well made. In this instance almost the only change in design lies in double expansion, and if such a change will result in increased economy, the action of this engine ought to show it. It is highly creditable, both to the Schenectady Locomotive Works and the Michigan Central Railroad, that they have taken this step toward securing better locomotives, and also that they have avoided all complications and alterations which would interfere with a direct comparison between the new and the old type.

In service this engine has indicated one difficulty which is inseparable from the use of the Stephenson link motion on a high-pressure cylinder. In France, Germany, England and Switzerland the same difficulty has been experienced. It is the early closing of the exhaust valve. For instance, in the ordinary locomotive, at short cut-offs, the exhaust closes a little beyond half stroke, and the steam in the cylinder is compressed about 10 times, which brings it up nearly to the boiler pressure at the time the piston reaches the end of the stroke. In the case of a high-pressure cylinder of a compound engine, the back pressure is so great, often reaching 45 lbs. at moderate cut-off, that a compression of 10 times raises the pressure at the end of the stroke enormously high, and the result is that the steam chest valve is lifted and steam is pumped into the steam chest, and the capacity of the engine is greatly reduced. To obviate this several plans have been proposed. Some foreign constructors use large clearances, which reduce the amount of compression by increasing the space into which the steam is compressed. Others cut out the inside of the valve,

which causes the exhaust to close later. Again, the throttle is closed, the steam wire-drawn and a longer cut-off used. This difficulty is inherent in the Stephenson link motion, and the same is true of the Joy and other motions of a similar character when used on a high-pressure cylinder.

The French constructors have been using a special valve gear with moderate success. It is not economical to use large clearances, and it is not advantageous to cut out the valve on the inside when the locomotive is to be used on heavy trains at low speeds and in starting trains, because the exhaust takes place perhaps too early. Some of the locomotives constructed in Europe have the common D valve and have been cut out on the inside one-quarter of an inch each side, thus giving what is known as $\frac{1}{4}$ -in. inside clearance. The Stephenson link motion may not prove to be satisfactory for high-speed, high-pressure cylinders at short cut-offs, but it can surely be made to work fairly well by a combination of tricks of various kinds. Probably the most satisfactory locomotive valve gear yet constructed with reference only to the proper distribution of the steam, omitting all reference to the details of its construction, is that in use on the Lehigh Valley road, where the compression and exhaust are wholly independent of the point of cut-off. The gear consists of three eccentrics, two operating a main valve and one a cut-off valve on the back of the main valve, a design frequently used in marine engine practice. There are other designs of gear that might perhaps as well be used for the high-pressure cylinder. The low-pressure cylinder can be well operated by the Stephenson motion as it now is.

The Michigan Central engine is now about perfect for freight service, but for express service some changes will be made. As now running, the inside clearance of the high-pressure valve is one-fourth of an inch and of the low-pressure one thirty-second. The cylinder clearances have been increased and a larger receiver will be put in. The low-pressure link-hanger will be shortened to obviate some of the difficulties at short cut-offs. Now both cylinders have the same cut-off, and there is excessive back-pressure in the high-pressure cylinder at cut-offs less than half stroke.

One other thought suggests itself in connection with the subject. It is with reference to the location of cylinders of sufficient dimensions for compounding the large consolidation engines, of which there are many in use, and for which double expansion will prove most advantageous. When the diameters of the cylinders are made large enough to meet the requirements they cannot be placed wholly outside of the frames, as in the present construction, for the reason that the maximum width allowable is too small to permit of it. Whether the solution of this problem will be the use of two outside low-pressure cylinders and one inside high-pressure, or two outside cylinders on each side, one high and one low pressure, placed tandem, it is difficult to say. Both types have advantages. In France, on the Northern railroads, two cylinders on each side placed tandem have met with favor, and many of their ordinary locomotives have been changed to compound after this manner, which is known as the Woolf type, one valve being used to control the admission and exhaust to both cylinders. Whatever may be chosen for the larger locomotives, there is reason to believe that the low cost, the simplicity of the design, reduction of friction of the working parts, and the comparative cost of repairs will lead the majority of railroad men to favor the two-cylinder type wherever it is possible to use it.

Two Drawbridge Accidents.

Two passenger trains came near running upon unfastened drawbridges near New York last week. On the Long Island road, near Blissville, N. Y., on Tuesday forenoon, the engineer of a westbound passenger train, containing 32 passengers, ran past a distant signal and apparently failed to heed the home signal also, although he came to himself at some point before reaching the draw, and tried to stop. The draw was open, and but for the alertness of drawtender McKedy the engine would probably have plunged into the creek. This man saw the danger, and promptly shut the draw. It lacked a few feet, however, of being in position when the engine struck it and ran some distance on the sleepers.

On the New York, New Haven & Hartford, at the Housatonic River, east of Bridgeport, Conn., on Friday night, about 6.30, the eastbound Shore Line Express, one of the fastest on the road, was thrown off at the derailing switch at the approach to the drawbridge and the passengers received quite a shaking up, the speed being considerable. Three cars were derailed and ran on the sleepers and the ground for some distance. The first report was to the effect that the signal showed clear and that the derailing switch was

out of order; but on the following day an interview with Vice-President Reed was published stating that the engineer had disregarded the signals, which stood at danger. It appears that the bridge was closed, but that the rails which overlap the space between the draw and the fixed spans, and have to be lifted to move the draw, were not fastened.

The moral of these occurrences is obvious and needs to be stated only for the purpose of bringing to mind the fact that such morals are being frequently afforded us in actual service. We do not need to resort to theory or speculation for arguments in support of the use of every possible safeguard in railroad working. The Long Island road can apparently learn a simple but important lesson from the New Haven in the matter of a derailing switch. The New Haven road did indeed secure the safety of its passengers, but by a margin by no means wide. A rough ride of a few hundred feet on the sleepers is not to be compared with a disastrous fall into a river which kills half the passengers, but it is nevertheless an event which no reputable road wishes to advertise itself by.

It is stated that the engineer who made the mistake at Bridgeport has been running 20 years, which is just about the length of time that the Harlem River drawbridge, over which these trains run, was equipped with a special danger signal, consisting of a large disc, so hung that it would demolish the smoke stack of any engine which should presume to pass it when at danger. We understand that this disc has never, in its twenty years' existence, received a scratch. It was taken off a year or two ago, when semaphore signals were put in. Quite likely this engineer is one of those who have run over this bridge daily for the long period named without ever making a mistake; and, on the surface, this would appear to be a case where a runner makes one of those mistakes which are regarded as inevitable. But there is one further precaution that can be taken against such errors, and that is to enforce the rule in use on the Boston & Albany, which requires both engineer and fireman to look for every fixed signal and to communicate with each other immediately when they have seen it. Like many other rules applicable to a high standard of efficiency in train running, this is one that cannot be enforced without considerable care. Many engineers and firemen, not realizing its value to themselves as individuals—to say nothing of the interest of their employer—will neglect to carry it out. But this is no reason for neglect on the part of the superintendent, and until it has been shown impossible to get good out of such a rule it is incumbent upon careful superintendents to consider it. One of the familiar arguments in railroad officers' mouths is that the best of men will blunder; but a familiar fact in their practice is the universal dependence upon a single individual for the safety of a train. If men will inevitably make mistakes, why not provide a check; and in the case under consideration, what simpler check than to set one of two men as a monitor over the other? It will at once be said that this is not so simple in practice as in theory; but on the other hand, it is not so difficult in practice as in the minds of objectors.

Railroads and the Milk Traffic.

It has long been known that the farmers who supply the city of New York with milk make no profit. The city receives milk practically from all points of the compass, and from a region which has been extended to include counties several hundred miles distant. The carriage of milk has proved a profitable one for the railroads, and naturally, after having once established their arrangements for hauling and handling milk, the carriers have seen increased revenue in extending their facilities to the more remote dairy regions. Thus, while New York City has grown, the supply of milk has increased yet faster. Practically, the price of milk to middlemen and peddlers at the railroad platforms has by these extensions been fixed by the abundant supply at figures which are just a little higher than the point at which the milk producer would give up in despair and stop sending his product to market. As the keeping of stock is necessary for good farming, the farmer has heretofore kept on supplying milk, though without profit at the end of the year.

The farmers have long been restless under this unfortunate state of affairs, but, partly from ignorance, have not always taken the most judicious way towards a remedy. Some two years ago these milk producers thought that their low prices came from high railroad rates on milk, and brought an action before the Interstate Commerce Commission. Their points were first against the grouping system, under which each farmer, no matter what his distance from New York, paid the same rate for transportation, 35 cents per car of 40 quarts, or, counting in ferriage, almost exactly one cent per quart. Commissioner Walker, in his decision, sustained the grouping plan, and, in any case, this plan only affected the price as between one farmer and another, and did not touch the main question at all.

The next point of the farmers, that the rate of one cent a quart was in itself too high, and came out of the farmers' pockets, was also decided against them. Clearly they had no case, because, if the railroads had reduced their charges one-half, the reduction would have gone to the New York dealers, and the producers' price would not have advanced a fraction.

Lately the discontent has taken a new shape. The farmers are organizing to control prices in some way by combination—how, is not very clear. The New York Tribune lately gave much space to the question from the farmers' point of view, but left the actual problem as much in the dark as ever. The producers have not money enough to form a company which shall deliver all milk in the city at a fixed price. One proposition is to give all the milk into the hands of selling agents, who shall sell at an advanced price and only for cash. This would be a good thing to guard against bad debts, but no body of agents could keep up a high price in the face of the increased supply beyond the city's needs, which such a high price would be sure to bring out. So that, with all their organizing, the problem of a price with profit to the producers is as difficult as ever.

We supposed when the difficulties became clear to the farmers that they would turn again to the railroads, and this is now the case. The leading spirit among the producers now says that the railroads "hold the key to the situation." His plan is for the carriers to buy the milk from the farmers at the higher fixed price—at least that is what it amounts to. The farmers are to set the price and to ship the milk in special cars consigned to the railroad agents, who are to deliver only c. o. d., and at the price already fixed, plus the freight charges. The very fact that such a plan is seriously put forth shows the stress of the situation, and shows also the ignorance of the laws of political economy and of trade, which seems to stand in the way of all legitimate improvement in the condition of that large and important class who live from the land. Surely, the carriers have trouble enough, and more than enough, to arrange the perplexing questions which arise in their own business of transportation. They should not also buy and sell milk nor meddle with its purchase and sale. Nor could such a scheme accomplish its purpose of securing a higher price to the farmer. If the price agreed upon were one cent a quart higher than usual, a flood of milk would come pouring in upon the railroads from every producer who wanted to secure the extra profit. When carried to market this extra milk would find no purchaser at the agreed price, and, being perishable, must be sold at a cent or so for feeding to pigs, or thrown away. Should the carrier shoulder this loss? Certainly not. Then it must come out of the sum paid the farmer, and thus the average price per quart received by the producer would fall back to the average received now, which is governed by supply and demand, as it always must be. Meanwhile it is acknowledged by all milk producers that to corner the supply is impossible, owing to the large number engaged in producing milk, the large extent of the territory covered and the difficulty of getting producers to limit the quantity in any way except by the force of unprofitable prices.

We have not yet heard the last of this matter, and it would occasion no surprise if after all there should be another quarrel with the railroads as the authors of the whole mischief. And this, too, in spite of the fact, which is as clear as day, that the rate of freight is added to the producers' price of milk when sold, and, whether high or low, does not affect the farmers' profits a particle.

Train Accidents in 1889.

We give herewith our usual annual summary of the records of train accidents which have been published month by month during the year, together with comparisons for the 17 years that these records have been kept. The figures speak for themselves, and call for little comment beyond that which is given with the monthly accounts. It will be seen that the totals in nearly all the items are considerably less than those of the preceding year. As we have heretofore pointed out, by far the largest number of casualties to persons are the result of causes classed under the head of negligence. Of the passengers killed, a considerable fraction were on freight trains, or on engines, or similar places other than regular passenger trains. The number of tramps and other persons, on railroad premises without right, who were killed during the year is somewhat smaller than in 1888.

The worst train accidents of the year were those at Johnstown, Pa., in May, and at Thaxton's, Va., in July. The latter, as well as the former, was, it will be remembered, the result of an unusual rainstorm. For convenience of reference to the monthly accounts we note the dates of the six other most important accidents to passenger trains: Auburn Park, Ill., September; Big Flat Creek, Tenn., August; Lorenzo, Ill., April; Palatine Bridge, N. Y., September; Talmadge, O., January; White Sulphur Springs, Va., December. A dozen people were killed in a freight wreck at Latrobe, Pa., in June, the accident being a sequence of the Johnstown flood. The serious disaster at St. George, Ont., Feb. 27, was reported in the Railroad Gazette of March 8, but is not included in our record, which is confined to the United States. The question of the danger from fires in cars came up conspicuously in connection with a collision at Boyds, Me., in February, and a derailment at Pittsburgh, Pa., in November.

The classification of casualties, according to the kind

of accidents in which they occurred, sums up for the year as follows:

	Killed.	Collisions.	Derailments.	Other acc'd'ts.	Total.	Total 1888.	Total 1887.
Employes.....	170	154	12	336	492	434	406
Passengers.....	42	66	1	108	207	168	207
Others.....	55	15	1	48	119	65	43
Total.....	267	235	15	492	1010	667	656
Total 1888.....	317	324	26	697	1364	1010	916
Total 1887.....	287	330	30	647	1294	916	110
INJURED.							
Employes.....	515	449	21	978	1063	890	890
Passengers.....	242	491	9	745	1012	916	916
Others.....	20	29	1	49	99	94	140
Total.....	777	969	31	1772	2209	1916	1916
Total 1888.....	949	1218	37	2204	2204	1916	1916
Total 1887.....	871	1021	44	1946	1946	1916	1916

The number of persons killed and injured in train accidents during the past 10 years, as tabulated in our accounts, was as follows:

	Killed.	Injured.
1880.....	492	1,772
1881.....	407	2,204
1882.....	636	1,946
1883.....	416	1,409
1884.....	307	1,530
1885.....	389	1,760
1886.....	1,910	1,910
1887.....	280	1,588
1888.....	414	1,597
1889.....	315	1,172

The more prominent causes of collisions are shown in the following table:

CAUSES OF COLLISIONS:	1889.	1888.	1887.	1886.	1885.
Train breaking in two.....	82	67	55	81	65
Misplaced switch.....	59	61	44	41	33
Failure to give or observe signals.....	58	62	53	30	17
Mistake in giving or understanding orders.....	46	40	42	27	27
Miscellaneous.....	150	130	87	43	47
Total explained.....	395	330	281	222	189
Unexplained.....	354	444	419	275	275
Total.....	749	804	700	501	464

That our accounts are gathered from the newspapers, and are, therefore, far from perfect; that the "passengers injured" is an unsafe column in which to make comparisons, because of the different standards of reporting, and that for these and other reasons our totals and our deductions must be "handled with care," and used chiefly for comparison, we suppose is now well known to our readers. It is probable that by another year it will be possible to make some comparisons with official figures, as the Interstate Commerce Commission has now taken up the work of tabulating the reports made to it by the railroad companies. At this writing we have none of the results of what has been done except the brief summary in the advance sheets of the third annual report of the Commission, which was given in the *Railroad Gazette* of Jan. 10. This report shows 315 passengers, 2,070 employees and 2,897 other persons killed, a total of 5,282. The number injured was 25,888. These figures are for the year ending June 30, 1888, and are from about 93 per cent. of the railroads of the country. The Commission estimates that a complete report would show 5,693 persons killed and 27,898 injured; but, as we know from statistics heretofore given in state reports, a very large percentage of this enormous aggregate is attributable to causes other than train accidents.

Our Iron Production for 1889.

Our production of pig iron for the year just passed, as ascertained by Mr. Swank, was 7,004,525 gross tons. If we could have increased it by 65,857 tons, or by the product of three additional furnaces, it would have been just twice that of 1880, and it is more than two and three-quarter times our production of 1879. The increase over our make of 1888 was 1,114,787 tons, or nearly 17.2 per cent. Both the increase from 1880 and that from 1888 may be regarded as noticeable, considering our light addition to railroad mileage for the year, only 5,330 miles, as against 7,028 miles in 1888, and 13,080 in 1887, in which year we produced 6,417,148 tons.

Mr. Swank estimates the British production at 8,300,000, or only about nine per cent. in excess of our make. Assuming this to be approximately correct, we would have the production of the two countries for the last three years by half years in gross tons:

	American.	British.
1887, 1st half.....	3,049,295	3,088,115
" 2d ".....	3,067,833	3,073,812
1888, 1st ".....	3,020,192	3,092,804
" 2d ".....	3,468,616	3,995,830
1889, 1st ".....	3,667,767	4,083,597
" 2d ".....	3,936,758	4,220,000

Our make by months, which can be very closely approximated from the *American Manufacturer's* monthly record of the blast furnace capacities, and the average price per month of No. 1 anthracite, as returned by Mr. Swank, is given below: The stocks of unsold pig iron having been on Dec. 31, 1888, 300,144; June 30, 1889, 502,034, and on Dec. 31, 1889, 247,679 gross tons.

APPROXIMATE PRODUCTION BY MONTHS, AND AVERAGE MONTHLY PRICES FOR 1889.

	Production.	Price.
January.....	613,515	\$18.00
February.....	555,100	18.00
March.....	635,674	18.00
April.....	607,418	17.35
May.....	563,509	17.00
June.....	601,112	17.25
July.....	619,027	17.50
August.....	631,515	17.50
September.....	700,325	17.50
October.....	708,795	18.50
November.....	760,425	19.25
December.....	7,509,109	

This total within less than one-tenth of one per cent.

TRAIN ACCIDENTS—THEIR NATURE AND CAUSES FOR SEVENTEEN YEARS.

	1889.	1888.	1887.	1886.	1885.	1884.	1883.	1882.	1881.	1880.	1879.	1878.	1873-7.
TRAIN-MILEAGE in the United States in millions of train miles.....	723.0	688.8	644.0	569.8	560.2	541.3	538.0	476.0					
COLLISIONS:													
Train.....	379	404	362	338	316	288	413	388	306	274	206	142	155
Runaway engine or train.....	260	311	309	127	129	138	177	160	146	141	86	70	43
Other.....	110	89	29	36	28	27	39	33	24	22	19	8	43
Total collisions.....	749	804	700	501	464	445	630	581	476	437	310	220	235
DERAILMENTS:													
Broken rail.....	32	61	50	45	102	60	84	37	85	45	56	17	71
Loose or spread rail.....	28	42	31	81	65	68	88	72	29	21	21	5	22
Broken bridge or trestle.....	42	40	30	30	32	34	35	38	44	16	17	21	24
Broken or defective switch.....	10	29	23	7	13	9	12	2	5	5	2	1	9
Broken or defective frog.....	7	10	7	20	11	11	7	4	2	2	2	2	5
Other defects of road.....	1	1	2	1			1	3	4			2	9
Total defects of road.....	120	180	152	174	222	182	227	156	160	89	94	72	149
Broken wheel.....	28	48	27	37	41	43	40	33	58	21	21	5	22
Broken axle.....	45	44	45	62	48	30	60	52	50	30	30	18	32
Broken truck.....	20	27	8	14	18	12	14	10	7	11	13	10	10
Failure of coupling or draw-bar.....	5	9	3	3	6	3	2			1	2	4	4
Fall of brake or brake-beam.....	9	9	10	6	10								3
Other defects of equipment.....	10	13	6				3	3	6	5	2	1	4
Total defects of equipment.....	120	148	100	122	123	67	129	102	121	64	66	41	76
Misplaced switch.....	54	70	49	68	55	82	89	90	85	80	80	48	48
Runaway engine or train.....	10	3	4	4	4	2	2	2	12	4	4	5	9
Open draw.....	8	14	6	2	3	1	2	1	5	1	2	2	2
Bad switching.....	1	4	2	2	5	5	4	6	2	1	2	4	4
Other negligence.....	8	18	12			2	9	1	4	7	3	6	5
Total negligence in operating.....	92	117	74	76	61	94	112	101	104	98	90	65	97
Cattle on track.....	41	57	32	30	25	28	45	48	42	43	35	30	48
Wash-out.....	5	22	6	27	30	7	13	5	15	8	22	13	20
Land slide.....	29	19	11	23	22	25	23	18	17	11	36	28	28
Accidental obstruction.....	24	34	16	21	7	18	16	7	14	4	7	4	6
Malicious obstruction.....	8	20	31	17	17	42	53	37	45	25	24	26	38
Rail or switch purposely misplaced.....	20	14	12	15	15	12	12	17	13	8	11	15	15
Other unforeseen obstructions.....	5	22	12	24	13	17	16	12	13	8	11	15	15
Total unforeseen obstructions.....	131	193	129	167	135	152	199	144	150	108	113	125	158
Others.....	41	57	32	30	25	28	45	48	42	43	35	30	48
Unexplained.....	293	385	243	102	136	186	229	238	310	237	192	175	223
Total derailments.....	759	1,032	705	641	681	681	926	741	857	597	557	481	709
ACCIDENTS WITHOUT COLLISION OR DERAILMENT:													
Boiler explosions.....	13	15	14	19	11	16	13	12	14	14	17	11	11
Cylinder explosions.....	3	7	2	2		2	5	1	1	3	1	1	3
Broken parallel or connecting-rod.....	5	22	17	22	28	17	26	11	21	13	15	11	10
Cars burned while running.....	4	7	8	8	9	13	13	7	8	6	4	23	9
Various breakages of rolling stock.....	18	15	34	6	17	13	23	9	21	4	5	2	13
Other causes.....	18	33	12	12	7	4	4	2	4			1	6
Total without collision or derailment.....	61	99	86	60	72	65	84	42	65	44	43	26	61

RECAPITULATION.

Collisions.....	749	804	700	501	464	445	630	581	476	437	310	220	235
Derailments.....	759	1,032	705	641	681	681	926	741	857	597	557	481	709
Other accidents.....	61	99	86	60	72	65	84	42	65	44	43	26	61
Total.....	1,569	1,935	1,491	1,211	1,217	1,191	1,640	1,364	1,458	1,078	910	740	1,065

* Train mileage is taken from Poor's Manual, which gives revenue mileage only; that for 1889 is estimated.
† Average per year, five years, 1873 to 1877, inclusive.

CASUALTIES TO PASSENGERS AND EMPLOYEES IN TRAIN ACCIDENTS IN 1889.

Tabulated According to Classes of Causes.

	Defects of road.		Defects of equipment.		Negligence in operating.		Unforeseen obstruction and maliciousness.		Unexplained.		Total.	
	Pass.	Emp.	Pass.	Emp.	Pass.	Emp.	Pass.	Emp.	Pass.	Emp.	Pass.	Emp.
	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.	Killed.	Injured.
January.....	4	7	3	5	5	18	16	43	4	11	9	34
February.....	12	12	7	3	3	1	7	15	3	1	3	49
March.....	10	3	1	3	9	6	7	27	9	1	16	45
April.....	1	9	15	1	1	6	8	11	12	23	7	10
May.....	2	4	1	3	3	10	14	56	29	40	4	11
June.....	3	13	1	7	3	13	14	43	6	25	9	14
July.....	2	39	14	1	8	18	11	65	20	61	12	17
August.....	3	18	1	4	1	13	62	17	48	19	3	1
September.....	14	4	5	1	3	5	46	21	103	23	8	10
October.....	39	9	7	1	2	4	19	17	58	10	14	15
November.....	6	5	4	9	17	3	19	28	95	3	2	4
December.....	16	167	30	81	7	58	21	63	46	291	189	595
Year.....	5	185	45	153	16	65	35	92	92	388	217	573
Year 1888.....	139	406	48	142	11	50	39	57	48	279	218	456

* Included in unexplained.

of the final total as obtained by Mr. Swank is a remarkably successful effort to gather statistics. The first half year's estimate was 2.7 per cent. too small, and the last half year's 2.4 per cent. too large. The result of this year's estimates of furnace capacity in the *American Manufacturer* will be watched with considerable interest. Confidence in their accuracy during the year past justified the *Railroad Gazette's* estimate in November that our make for 1889 would be fully seven and a half million tons.

During the first half of the year our increased production over the last half of 1888 was due wholly to an increased demand for those kinds of pig iron which are used for general foundry and mill purposes, there having been a decrease in the make of Bessemer iron in the last half of 1889. There was a slight decrease in the make of mill and foundry iron and a considerable in-

crease in the make of Bessemer pig. The production of the two kinds of iron has been as follows:

	First half of 1888.	Second half of 1888.	First half of 1889.	Second half of 1889.
Bessemer pig iron.....	1,178,508	1,459,351	1,419,351	1,738,238
Foundry and mill.....	1,841,584	2,210,295	2,248,416	2,198,420

The increase in Bessemer made was nearly 20 per cent., and the increase in foundry and mill irons nearly 10 per cent. About 41.5 per cent. of last year's production was Bessemer iron.

There was a decrease, generally slight, in the following States: Maine, Massachusetts, New York, North Carolina, Georgia, Texas, Kentucky, Indiana, Missouri and Colorado, and an increased make in Connecticut, New Jersey, Pennsylvania, Maryland, Virginia, Alabama, West Virginia, Tennessee, Ohio, Illinois, Michigan, Wisconsin, Oregon and Washington. Pennsyl-

vania is credited with the largest increase, 528,621 gross tons, and Alabama next with 305,238 tons. The increased production in the South, including Maryland and Texas, but excluding Missouri, since 1880, when it was only 354,773 gross tons, to 1,307,948 last year, is almost at the rate of 300 per cent. for the decade. Starting in 1860 with a make of 821,223 gross tons, it will be seen that we have, on the average, decidedly more than doubled our production with each decade. And while it may be doubted if we can continue at this rate, the history of the two past years does not seem to offer any valid argument in support of such doubts, as our increase for last year was very nearly 19 per cent. over that of 1887, despite the fact that we built 13,080 miles in that year as against 12,358 miles in the two years 1888 and 1889.

A number of shippers in Jasper County, Iowa, have won a suit, in the Supreme Court of that State, against the Chicago, Rock Island & Pacific to recover rebates such as were allowed other shippers during the years from 1880 to 1884. There were several counts in each case, aggregating 2,826, and the amount of rebate claimed in each case is \$17, amounting to \$48,722. These suits were brought under the common law, on the theory that the rate which favored persons paid was a reasonable rate, and therefore the difference between it and the money paid was an unreasonable charge. The opinion is written by Judge Givan. It holds that, when these causes of action are alleged to have occurred, there was no statute or national institute fixing the rates, and the right to maintain such actions must be determined by the common law. The main question discussed by the court is its application of the statute of limitation in the present case, and whether or not such statutes defeat the present action. The court holds that the statutes do not prevent the actions being brought now. Looked at from one standpoint, this is serious enough. If every railroad had to pay rebates on this scale, it would bankrupt even the few which state commissions have left in a paying condition. Some of the English roads learned this lesson to their cost thirty-five years ago. But the very magnitude of the affair renders the ultimate enforcement of a decision like this impossible. While the statute of limitations may not technically hold good, it is practically out of the question for the courts to bankrupt the present owners of a road because the representatives of their predecessors some years ago followed a practice which was then universal. The interpretation of the common law which underlies this decision is a good one, and it would have been vastly better for the country if it had been applied from the outset. But the time to establish it was in 1850, not in 1890. If the abuse went on for forty years practically unchallenged it became a usage. A reversal of policy on the part of the courts would be a good thing for the future; but if it is applied in a rough and ready way to past transactions, it becomes a means of injustice, and destroys more good than it creates.

The Indianapolis Union passenger station, which is illustrated on another page, is not exactly new, but is such an excellent example of a modern railroad station that it is worthy of note even at a late day. It is noteworthy not only for the merit of its design and construction, but for its management as well. After two years' use it looks as clean and neat as if but a month old. The telegraph operator smokes a pipe in the faces of customers, and quite likely other imperfections would be discoverable if one were to search for them. The operator, however, is probably not a railroad employé. The toilet conveniences are equal to those of a first-class hotel and in agreeable contrast to many stations that are older and therefore ought to know better. The only disagreeable thing about the station that obtrudes itself is the poor manner in which trains are announced. It is not an easy matter for an untrained person to satisfactorily give a lengthy announcement in a large room, but railroad managers seem to think that any one can fill the place of a first-class elocutionist. The Indianapolis man can have the satisfaction, however, of knowing that there are plenty of criers much worse than himself. The fellow at the Pittsburgh Union Station is not a whit better than a gong or an electric "buzzer." Such an appliance could convey the information that some train was ready to start for some place, and that is all that the man does. Boston and Buffalo are among the cities containing stations that divide the honors with Pittsburgh on this point.

Commissioner Hill, of the Denver Demurrage Bureau and the Colorado Demurrage Association, has issued a pamphlet, showing in tabular form the results of the operation of these associations. It appears that the eight towns outside of Denver, comprising the Colorado association, have an organization distinct from the older concern. For the two months that these places have had the rules in force, the estimated saving, at 50 cents a car, is \$40,609. Of this over one-half is at Pueblo. The total at Colorado Springs is \$5,642. The average daily detention has been reduced from 11½ to 3½ days. A table is given showing the proportion of saving accruing to each road. The Denver & Rio Grande stands at the head of the list with nearly one-half of the whole amount. The Denver bureau, during its 14 months existence, has handled 125,000 cars and has reduced the average detention from six to three days. The total decrease in the 14 months is 375,698 days.

At last the Board of Street Opening of New York City has granted permits for the Pennsylvania Railroad and the Central of New Jersey to erect bridges over West st., New York City. This is a step which has long seemed necessary not only for the comfort, but the safety of an immense number of people, and which the railroads themselves have for some time been anxious to take; but it has been prevented by the peculiar ideas of the municipal authorities of New York. If the plan is carried out for these two railroads it will perhaps be followed very shortly by the Erie, and the Delaware, Lackawanna & Western, whose ferries are reached only at the expense of great discomfort and considerable peril, and whose passenger business has in recent years grown to be very great.

The Union Pacific and the Chicago & Northwestern with its controlled lines have sent Chairman Walker formal notices of withdrawal from the Interstate Commerce Railway Association. Mr. Adams is careful to say that he is acting by order of the directors. Both he and Mr. Hughitt simply say in effect that if other roads can influence competitive traffic by building new lines or leasing old ones, they think it unjust that they cannot influence it by a traffic agreement "not affecting rates." Mr. Adams says that the Union Pacific takes this action with extreme regret, and that if the divergent views can be reconciled his notice will be withdrawn. The Association will consider these withdrawals February 11.

The coroner's jury sitting in the case of the accident in the Louisville and Jeffersonville bridge caisson returned a verdict Jan. 23. They found that the victims came to their death by drowning, and believed, from the evidence, that the accident was "the result of a part of the men in the caisson losing their presence of mind and becoming panic-stricken from some unknown cause, forcing open the lock-gate at that time leading from the caisson, thereby allowing the pressure of air to escape and as a result the caisson filled with water and sand. And we further find that said accident was not due to any carelessness on the part of SooySmith & Co."

NEW PUBLICATIONS.

Power Towing on Canals and Rivers. By John M. Goodwin, C. E., Sharpsville, Pa.

This is a pamphlet written primarily to describe and advocate a system of cable towing devised and patented by Mr. Goodwin, and which he has developed with special reference to the needs of the Erie Canal. It is, however, really a treatise on the subject of power towing, and especially on driven cable traction for canals and waterways. The pamphlet itself is 80 pages, of which 14 are given to a thorough index.

Mr. Goodwin takes up the history of cable towing and describes, briefly, the patents of Peter Cooper, taken out in 1820, the bar-chain patent of 1872 and the French patent of Troll and Mercier of 1862. He reviews, also, somewhat the idea of towing by locomotives and the submerged chain hauling system. The difficulties and imperfections of all of these prior devices are pointed out at some length.

The one which seems to have had the most practical application, with the best results, is the submerged chain system, by which tows ascend the Sheekana, a tributary of the Volga, against a current of eight miles an hour; while the Meyer-Wernigh system of submerged wire cable towing is largely used in Germany, Belgium and France. This system would seem to have one great advantage over any system of towing by driven cable, in that the power developed by the machinery is almost entirely expended in useful work in hauling the tow, while according to Mr. Goodwin's estimate 62 per cent. of the engine power must be absorbed in driving the cable for his system. In detail his estimate of the consumption of engine power is as follows, 20 fully loaded boats and 20 partially loaded being hauled by one section of cable:

	Per cent.
In moving boats.....	20
Moving cable and rollers.....	62
Friction of end drums and contingencies.....	9
Movement of engines and machinery.....	9
Total.....	100

The objections to the submerged chain or cable system are several. It involves giving boats operated by it the right of way in a canal as against all other boats. At any bend of the stream the towing power tends to drag the chain toward the chord of the arc; and there is a tendency to accumulate the slack of the chain at various points on the bottom of the river; and while it is comparatively simple to drag it back into its proper position in the channel on curves, the redistribution of the slack is difficult. Another difficulty has been in the inequality of the winding of the drum. On 207 miles of cable in the Upper Elbe, 322 breaks of the cable took place in one year, all between drums. Still another difficulty is found in getting sufficient steering power. The chain has a way of leading the tug in spite of the rudder. None of these difficulties would arise with a driven cable.

One of the great difficulties in the problem of driven cable towing has been that of hitching the tow line to the cable. It is obvious that some arrangement must be used by which the tow line can be hitched on or cast off readily without going ashore, and, above all, it is necessary that the momentum should be imparted to the boat

gradually. Mr. Goodwin's contrivance for this is simple in the extreme, being nothing more than a loop in the tow line, which is cast over the towing cable, and it is entirely within the power of the boatman to regulate the hold of this loop on the cable, so that his boat may be started as gradually as is desired and may be instantly cast off.

It is proposed to erect driving plant at intervals of 20 miles, and to carry the cables suspended over the canal on other cables crossing it. The whole scheme has been worked out in great detail. It is proposed to drive the cables at a speed of 2½ miles an hour. Power stations will be placed midway of each 20-mile section, and it is proposed to allow 10 boats on each 10 mile stretch going in each direction; that is, 20 boats on either side of the driving plant. Each section will be worked by two engines, one of 300 and one of 100 H. P., nominal. The estimated cost of this equipment for 350 miles of the Erie Canal is \$3,058,488. The operating expenses, cost of maintenance and interest are estimated to amount to \$848,762. The estimated revenue is

10,000,562 boat-miles at 10c.....	\$1,000,956
Or 6,673,041 " " 15c.....	1,000,956
Or 5,004,781 " " 18c.....	900,861

For the second season the estimate is 8,000,000 boat-miles at 15c., \$1,200,000.

In Mr. Goodwin's investigation to ascertain the amount of business of the Erie Canal he found the boat miles for 1887 to have been 10,009,562. The through tonnage was 908 million ton miles, the average trip having been 331 miles. The boat miles through were 5,472,282. The way tonnage gave 4,537,280 boat miles. Incidentally to his investigation of this subject Mr. Goodwin has got out some interesting figures as to the tonnage measurement of the boats running on the Erie Canal. In the twenty-two years preceding 1888, 5,482 boats were entered on the register, of which 1,133 were less than 100-ton measurement and 755 were below 90 tons. Of 109 tons measurement there were 606, of the 240 measurement there were 1,361. This was the greatest number of any given capacity.

Among other details necessary to the complete development of the subject, Mr. Goodwin investigated very carefully the character of cables to be used, and strongly recommends the Lang cable, made of plow steel, which has been found remarkably durable in shaft winding in English mines, where a speed of 1,700 ft. per minute is not unusual. At Newark-on-Trent a Lang rope, less than one-half inch in diameter, transmits from 30 to 35 H. P. without slip at a speed of 2,592 ft. per minute, equal to 29.45 miles per hour. The peculiarity of the Lang cable is that the strands forming the rope, and the wires forming the strands are laid in the same direction, contrary to the usual practice in making rope. Data from 10 years' service would indicate that this rope is 10 per cent. stronger, 20 per cent. more pliable, and 50 more durable than the best ropes of ordinary make. In the pamphlet are illustrations from photographs, showing comparative wear of the Lang wire rope and ordinary wire rope. Mr. Goodwin estimates, from actual experience, that for the Erie canal service the cable would last 17 canal seasons of 214 days each, although in his estimate of operating expenses he has allowed for renewal of cables and rollers in five years.

The *Northwestern Lumberman* made its paper for last week a special "White Pine Edition," with an elaborately engraved cover and about 25 extra pages, giving descriptions of mills, and of towns which have been built up by the lumber business in Michigan and Wisconsin, and portraits of prominent men connected with the business. There are also extensive tables of statistics of the lumber business, with comparisons of the records for the past 17 years.

THE SCRAP HEAP.

Notes.

The Chicago & Alton reports that it had no accident in 1889 by which a passenger was injured.

In the month of December four freight engineers on the Cincinnati and Chicago divisions of the Big Four earned \$190 each, and a number of other engineers received \$170 for the month's work.

The Indiana law requiring railroad companies to maintain a bulletin board at every station, on which to announce detentions of trains, has been declared unconstitutional. The state has appealed.

Speaking of the danger of getting the heels of their shoes caught in frogs while coupling cars, the *Shoe and Leather Reporter* advises brakemen to wear loose congress shoes, which can be slipped off easily.

The Pennsylvania Company is erecting sign posts at each county line naming the county, and a smaller post at the township line naming the township, and the bridges and sections along the line are being renumbered.

The Relief Department of the Pennsylvania lines west of Pittsburgh received 5,000 applications for membership in December. This, together with the large amount of sickness from influenza, created a great pressure of work in the superintendent's office.

General Manager St. John, of the Chicago, Rock Island & Pacific, when making a tour over the road, sends notice 24 hours ahead to each station agent on the line in order that all that may have a grievance or any recommendation concerning the business of the line may talk with him.—*Exchange.*

It is reported that the Illinois Railroad Commissioners will notify the railroads after Feb. 1 to comply strictly with the law which requires that accidents must be reported to the Commission. The fine for non-compliance is \$100 to \$500 in each case; but the railroads, like those

in many other states, follow their own pleasure in deciding how closely the provisions of the law shall be obeyed.

In the suit of the state of New York against the New York, New Haven & Hartford, to recover \$7,000 penalties for failure to comply with the act requiring steam heat to be supplied instead of stoves in the cars of all railroads in the state over 50 miles in length, the general term of the Supreme Court has given judgment for the plaintiff on a demurrer interposed by the defendant. It was held that the act applied to all trunk lines coming within the state.

The Illinois State Board of Railroad and Warehouse Commissioners in the case of the town of Lansing has ordered the Chicago, St. Louis & Pittsburgh, which moved its station out of Lansing last fall, and then told the 300 people living there to go to the South Chicago Junction, over a mile distant, to restore the station, and hereafter to keep an agent at Lansing; also to furnish reasonable train facilities at that point, both as regards passenger and freight. If this is not done the Attorney-General is requested to begin an action in mandamus to compel compliance.

The Missouri State Board of Railroad Commissioners has ordered the Missouri Pacific to restore within 30 days on the Leroy & Carey Valley Air Line Railroad the passenger train service discontinued on Oct. 20 last. Eighty-six citizens complained that the discontinuance was a great detriment to the traveling public, and was in violation of the agreements made with the various townships and cities which extended aid in constructing said road. The company set up the counter claim that the earnings of passenger trains operated between Yates Centre and Larned was insufficient to meet the expenses, and further, that the company was not advised that any agreements were in effect respecting the operation of the passenger trains. The board holds that, as a feeder to connecting lines belonging to the same system, the mere local earnings do not represent the usefulness of the division, as the bulk of the traffic goes through and swells the company's income on other branches. It also holds that where the people have voted bonds in aid of the construction of a line, "to supply greatly inferior facilities tends to defeat just expectations and to stimulate wide-spread dissatisfaction."

Central Officers' Association.

Assistant General Superintendent Peck, of the Cleveland, Cincinnati, Chicago & St. Louis, was elected Vice-President at the annual meeting in Cincinnati last week. Richard Carroll, General Superintendent of the Queen & Crescent, was chosen President. The constitution and by-laws of the association were so altered as to enlarge the territory, and other railroad centres will be invited in. The rules on the loaning of coaches to connections were so amended as to increase the charge from \$4 to \$5 per day for coaches and to make a charge of \$3 per day on baggage cars.

The Carmel Accident.

The South-bound night passenger train on the Louisville, New Albany & Chicago was wrecked near Carmel, Ind., about 8 a. m. Jan. 27, killing six and injuring 26 passengers. The tender first jumped the track just before reaching the trestle over Wilkinson's Creek, but the engine, tender and baggage car got over all right. The three passenger cars, including one sleeper, went down into the creek, and some of them took fire, but the accounts do not agree as to how many or which of them. The fire was extensive, however, and some of the deaths are undoubtedly to be attributed to it. The cause of the derailment is variously reported as a broken rail, spreading of rails and broken axle.

Australian Railroad Affairs.

In New South Wales the government have announced that they are prepared to receive proposals for the establishment of a first-class locomotive works. \$750,000 is the sum estimated as necessary.

Messrs. Hudson Bros., of Sydney, have secured a contract for 18 compartment carriages for suburban traffic.

The Victorian Legislature has passed a loan bill authorizing borrowing \$4,000,000, a large part of which is to be used for extending their railroads. At the same time they raised the salary of Mr. Spiegth, the Railroad Commissioner, from £3,000 to £4,000.

Russian Railroads.

The Russian Government has decided to construct a railroad from Lake Baikal, in Southern Siberia, to Stretinsk, on the Chinese frontier, and on the Amoor River.

Chilian Railroads.

A decree has been issued by the government, through the Minister of Public Works, fixing March 1 as the date for receiving proposals for the construction of a narrow-gauge railroad from the nitrate of soda fields of Agua Santa to Junin. The representative of the Nitrate Railways Co., will have to decide within six days of the date of opening the bids whether the company will exercise its right of preference in the construction of the line as granted to it by its concession.

The Philadelphia Company.

The following is a comparison of the operations of this natural gas company for the year ending Dec. 31:

	1889.	1888.	
Gross earnings.....	\$3,122,717	\$2,523,829	+\$598,888
Operating expenses.....	1,508,355	1,538,788	-60,433
Net	\$1,614,361	\$985,040	+\$629,321
Total debt.....	1,695,414	2,083,429	-388,015
Available assets.....	1,152,268	884,806	+267,462
Net debt.....	\$543,146	\$1,198,532	-\$655,386

During the year there were four monthly dividends paid at 12 per cent. per annum, and two quarterly at eight per cent. per annum, amounting to \$600,000; after deducting these from the net earnings of \$1,614,361 there was a balance of \$1,014,361. Amount expended on extension of 36-in. line, and charged to capital account was \$436,043, and amount expended for meters, etc., \$231,633; total \$667,677. This amount does not include \$229,117 paid during 1889 for the balance of the cost of the Westinghouse Building, which, together with amounts previously paid, has been applied to the reduction of the floating debt, on account of the sale of the building to the Westinghouse Air-Brake Co. The surplus of the company, after all expenditures, amounted to \$346,683.

The Jull Excavator.

The Spokane Falls Review prints an interview with an officer of the Oregon Railway & Navigation Co., on the recent snow blockade at Baker City. He says:

"We were blockaded at Baker City for a week. There were six blockaded trains there, some of them having

reached there a week ago last Saturday. There were about 300 passengers altogether, and three of them died while we were there.

"I guess we never would have got away from there had it not been for a new fangled snowplow that was sent out from Omaha. This machine is a new invention, and is called the Jull, after the inventor, who came with it. While we were laying at Baker City, small crews were sent out with two engines to buck snow, but they could do nothing. In one instance the engines left the rails near Union, and the fireman was killed and the engineer and conductor seriously injured."

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Atlanta & West Point, 3 per cent., payable on demand.
Flint & Pere Marquette, 3 per cent. on the preferred stock, payable Feb. 15.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atlantic & Western, annual, Jacksonville, Fla., Feb. 4.
Cumberland Railway & Coal Co., annual, Montreal, P. Que., Feb. 13.
Delaware, Lackawanna & Western, annual, 26 Exchange Place, New York City, Feb. 28.
Denver, Texas & Fort Worth, special, Denver, Col., Feb. 20, to act upon a proposed consolidation with the Union Pacific system in Colorado.
Guelph Junction, annual, Guelph, Ont., Feb. 4.
Illinois Central, annual, Chicago, Ill., March 12.
Keokuk & Western, annual, Keokuk, Ia., Feb. 5.
Manhattan Elevated, special, 71 Broadway, New York City, Feb. 28.
Missouri, special, 1828 Market street, St. Louis, Mo., Feb. 13.
Ridgeway & Clearfield, Philadelphia, Pa., Feb. 4.
Susquehanna & Clearfield, Philadelphia, Pa., Feb. 4.
Western Counties, annual, Yarmouth, Nova Scotia, Feb. 12.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The International Association of Ticket Agents will hold its next semi-annual meeting at the Hotel St. James, Jacksonville, Fla., Feb. 11.

The Master Car Builders' Association will hold its next annual convention at Old Point Comfort, Va. Rooms should be secured of Mr. F. N. Pike, manager, Hygeia Hotel, Fortress Monroe, Va.

The New England Railroad Club meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The Western Railway Club holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The New York Railroad Club meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The Central Railway Club meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The Northwest Railroad Club meets on the first Saturday of each month in the St. Paul Union Station at 7:30 p. m.

The American Society of Civil Engineers holds its regular meeting on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The Boston Society of Civil Engineers holds its regular meetings at Boston, at 7:30 p. m., on the third Wednesday in each month. The next meeting will be held at the American House.

The Western Society of Engineers holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The Engineers' Club of St. Louis holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The Engineers' Club of Philadelphia holds regular meetings at the house of the Club, 1,122 Girard street, Philadelphia.

The Engineers' Society of Western Pennsylvania holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The Engineers' Club of Cincinnati holds its regular meetings at 8 p. m. on the third Thursday of each month at the Club rooms, No. 24 West Fourth street, Cincinnati.

The Civil Engineers' Club of Cleveland holds regular meetings on the second Tuesday of each month, at 8:00 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the Fourth Tuesday of the month.

The Engineers' Club of Kansas City meets at Kansas City, Mo., on the first Monday in each month.

The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The Civil Engineers' Club of Kansas holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Accounting Officers' Association.

The Association of American Railway Accounting Officers met in New Orleans Jan. 22, 40 members being present. President Riebenack delivered a short address, and the report of the executive committee was read.

American Society of Civil Engineers.

Mr. Cope Whitehouse will read a paper at the meeting of the society on the evening of Feb. 5 on the Raiyan Canal and Storage Reservoir (Egypt), illustrated by the stereopticon.

Mr. Whitehouse writes: "It will be remembered by civil engineers present at the Buffalo meeting that Mr. Cope Whitehouse explained how he had been led to believe that the Pharaohs had made a storage reservoir in the Egyptian desert to the southwest of Cairo, and that he hoped to effect its restoration. In his paper before the society on Feb. 5 he will give the details of this project, which will add over one-half to the existing cultivated area of Egypt at a cost of about \$10,000,000. The

total value of this discovery, therefore, largely exceeds \$50,000,000. The storage reservoir will cover 160,000 acres and average 200 ft. in depth."

Engineers' Club of Kansas City.

Jan. 6, 1889, a regular meeting was held, President O. B. Gunn in the chair. There were present nine members. The treasurer reported as follows for the period of Dec. 5, 1888, to date: Total receipts, \$905.52; total disbursements, \$847.07. On canvass of ballots the following were elected officers for the coming year: President, W. H. Breithaupt; First Vice-President, J. A. L. Waddell; Second Vice-President, A. J. Mason; Directors, Wm. B. Knight, W. Kiersted; Secretary, K. Allen; Treasurer, F. W. Tuttle; Librarian, C. E. Taylor. The President-elect then took the chair. The retiring president delivered an address, pointing out in brief the prosperous condition of the club, the work being done by various members, and mentioning several of the great engineering enterprises now being carried out. It was voted to hold an informal lunch after the next meeting at the expense of the club, and to invite at that meeting the views of different members as to the advisability of having several such lunches during the year in place of the banquet as heretofore.

Mr. Wm. B. Knight has been appointed by the Executive Committee to continue as representative on the Board of Managers of the Association of Engineering Societies for the current year. Mr. W. H. Breithaupt having resigned from the Committees on "National Public Works" and "Affiliation of Engineering Societies," Messrs. O. B. Gunn and W. B. Knight have been appointed to serve on the former, and Messrs. W. Kiersted and Henry Goldmark on the latter.

New England Railroad Club.

At the next monthly meeting of the club, to be held at the United States Hotel, Boston, Wednesday, Feb. 12, at 7:30 p. m., the subject for discussion is, as stated last week, the Master Car Builders' Association form of contract for chilled wheels.

At the same meeting the new accident alarm system for railroads of the Train Dispatchers' Electric Signal Co., of Boston, will be explained, and a complete set of boxes will be shown.

Northwestern Track and Bridge Association.

The Northwestern Track and Bridge Association held its first regular meeting in St. Paul, Jan. 14. A number of Roadmasters and Bridge Inspectors and Superintendents were present. A constitution was adopted. J. McMillan, Roadmaster of the "Soo," was elected President; W. S. Darby, Bridge Inspector of the "Omaha," Vice-President; G. W. Kimball, Duluth & Iron Range, Second Vice-President; John Copeland, Superintendent of Bridges and Buildings of the Omaha, Treasurer, and D. W. Meeker, of the Northwestern Railroad, Secretary.

Mr. Kimball read a paper on Track Shimming, and arrangements were made to get papers on the care of pile bridges in the winter and on elevation of curves. Extracts from Mr. Kimball's paper follow:

Nearly all of the shims I use are made in the shop, as I consider them cheaper and much better made. We use old brake beams which have accumulated by substituting iron ones in equipping our ore cars with air. The wood of these beams is very hard, so as to be difficult to cut, the pores all being filled with the dust of the ore. These beams are sawed into blocks 10, 12 and 14 in. long, bored by a three-quarter-inch bit and sawed into shims of different thicknesses and packed for shipment. The blocks, 10 in. in length, have two holes bored in them 1 in. from the edge and 2 1/2 in. from the end of the block in opposite corners for the rail spikes. The 12-in. blocks have two holes bored each 1 in. from the edge and 3 1/2 in. from the end of the block in opposite corners for the rail spike, and, in addition, have two holes bored to the reverse of the rail holes, each an inch from the edge and 2 in. from the end of the block. The 14-in. blocks are bored in a similar manner as the 12-in., with the exception that the rail holes are 4 1/2 in. from the end of the block.

The joint shims are made by sawing oak with a 6-in. face into blocks 16 in. long, which are then bored for the slot holes, each 1 in. from the edge and 2 in. from the end of the block.

The 10 in. blocks are sawed into shims 1/2, 3/4 and 1 in. in thickness, the 12 and 14 in. blocks into shims 1 1/4 to 3 in. thick.

Shims up to 1 in. in thickness are fastened by two track spikes driven in the holes bored. Shims from 1 in. to and including 2 in. in thickness are secured by four track spikes. Shims over 2 in. in thickness are secured by driving two 8-in. track spikes in the rail holes, and two ordinary track spikes are driven in the end holes of the shim, unless the shim be greater than 3 in. thick, when the 8-in. track spike would be used in their place.

The practice of gaining down a tie so as to procure a shoulder for the brace is a poor one, as it not only destroys the ties, but seldom attains the object sought unless done to a mechanical nicety.

A gang, when beginning to do a piece of shimming, and after drawing the necessary spike, should plug the old spike holes, and, when fitting a shim, endeavor to have at least one rail hole cover the old spike hole and avoid as much as possible driving the spike in new wood.

As soon as the frost will permit, shims should be taken out and piled up either where spare rails are located on the section or at convenient points ready for use during the following winter.

Canadian Society of Civil Engineers.

The fourth annual meeting of the Canadian Society of Civil Engineers was held at Montreal on the 23d inst., the Governor-General, Lord Stanley, being present. The annual report of the society showed that the membership had been increased to seventy during the year.

At three o'clock the President gave his annual address in the Redpath Museum. On his right hand was seated the Governor-General, and on his left Sir Wm. Dawson.

After referring to the pride which the society felt in its distinguished honorary members, the speaker gave a minute account of the St. Clair tunnel being built by the Grand Trunk at Sarnia, and some description of the Forth Bridge. Referring to electrical engineering, he showed that that science was but in its infancy, and prophesied wonderful developments for it in the near future. He then referred to his own early engineering experiences. In 1841 there was a rapid development throughout Canada of large enterprises undertaken by government and private organization. The first enlargement of the Welland Canal to 9 ft. of water on the mitre sills was commenced in 1842. The earliest railroad in Canada, the Laprairie & St. Johns, was built in 1836.

The Montreal & Lachine Railroad was opened and worked with imported English equipment in 1847. The St. Lawrence & Atlantic (now Grand Trunk), on which he was chief engineer, was opened for traffic to St. Hyacinthe in 1849. The first

deepening of a straight channel in Lake St. Peter, upon which he reported with Sir William Logan, General McNeil and Captain Child, of the United States engineers, was begun in 1850. The Bytown & Prescott Railway, known as the St. Lawrence & Ottawa, now part of the Canadian Pacific, was commenced in 1851, and in the same year the Northern Railway from Toronto to Owen Sound, as was also about the same time the Great Western Railway from the Niagara River to Windsor (now Grand Trunk). Canada had now in operation 13,410 miles of railroads, representing a capital of \$727,180,443, which figures showed that, according to population, Canada was as well equipped in railroads as was the United States with her sixty-five millions.

The Governor-General then read the society resolution of thanks to their President for his untiring interest in their society. He believed the society would leave its distinctive stamp on Canadian works. Sir Wm. Dawson seconded the resolution and the meeting adjourned.

The following officers were elected for the ensuing year: President, Col. Gzowski, of Toronto, re-elected; Vice-Presidents, John Kennedy, W. Perley, and E. F. Hannaford; Treasurer, H. Wallis; Secretary, H. T. Bovey; Librarian, C. Chadwick.

PERSONAL.

—Mr. T. C. Salveter, General Manager of the St. Charles Car Co. for the past 12 years, has resigned his position, and will soon leave this country for a long absence in Europe.

—Mr. H. K. Dixon, Auditor of the Cleveland & Canton, has resigned to accept the position of Auditor of the Fort Worth & Rio Grande, succeeding Mr. A. L. Robinett, who was recently appointed to the position.

—Mr. I. G. Rawn, who was recently appointed Superintendent of the Richmond, James River and Peninsula Division of the Chesapeake & Ohio, has been appointed General Superintendent of the Baltimore & Ohio Southwestern.

—Mr. Henry Tandy has resigned the position of Superintendent of Motive Power on the New York, Ontario & Western Railroad, and E. Minshul, Master Mechanic, has been placed in charge of the department until further notice.

—Mr. George C. Pratt, who was connected with the firm of Thomas B. Innes & Co. before it dissolved, has associated himself with E. H. Wilson & Co., dealers in railroad supplies, of Philadelphia, whose car works are at Lamokin, Chester, Pa.

—Mr. J. E. Childs, who resigned as General Manager of the New York, Ontario & Western in April, 1889, to become Assistant General Manager of the Lake Shore & Michigan Southern, has resigned the latter position, and returned to the New York, Ontario & Western as General Manager.

—Mr. C. E. Doyle, Superintendent of the Pittsburgh & Western since last May, and formerly Superintendent of the Cairo, Vincennes & Chicago, has been appointed Superintendent of the Richmond, James River & Peninsula division of the Chesapeake & Ohio, to succeed Mr. I. G. Rawn, resigned.

—Mr. Henry S. Marcy, who was elected Vice-President and General Manager of the Fitchburg last November, was elected President of the road this week at the annual meeting of stockholders, to succeed Mr. E. B. Phillips, whose resignation has been in the hands of the directors for some months.

—Mr. D. J. Mackey, President of the Evansville & Terra Haute and other roads in Indiana and Illinois, has been elected President of the Chicago & Eastern Illinois, to relieve Mr. H. H. Porter, who proposes to take an extended European journey. Mr. Porter has been elected Chairman of the Board of Directors.

—Mr. Charles A. Coombs, formerly General Manager of the Boston, Hoosac Tunnel & Western, and who was for a year until July, 1889, General Manager of the New York & Northern, has, it is announced, been appointed General Manager of the Annapolis & Baltimore Short Line, to succeed Mr. C. M. Leilich, resigned.

—Mr. Edward Lewis, Superintendent of Bridges and Buildings of the Allegheny Valley Road, died suddenly at Kennedell, Pa., Jan. 13, from the effects of injuries received at Verona, while being conveyed in a special train to his home at South Oil City. He was born at Penn's Manor, Berks County, Pa., April 11, 1834. He learned bridge building while in the employ of the firm of Piper & Shiffer, who constructed the bridges on the Philadelphia & Erie. For many years he was in the employ of the Keystone Bridge Co., leaving that firm in 1870 to become Superintendent of Bridges and Buildings on the Corning, Cohanawake & Antrim Road. In 1875 he assumed the same position on the Allegheny Valley, which he retained until his death.

—Mr. A. B. Plough, General Freight and Passenger Agent of the St. Paul & Duluth, has been appointed General Manager, to succeed the late E. L. Dudley. Mr. Plough came to the St. Paul & Duluth soon after Mr. Dudley was appointed General Manager from the Central Iowa, of which he had been General Freight Agent. He has been in railroad service since 1871, the entire time, until his connection with the St. Paul & Duluth, in the service of the Central Iowa, beginning on that road as a baggage man, and serving successively as Station Agent, Traveling Agent, Assistant General Freight Agent and General Freight Agent. His successor as General Freight and Passenger Agent of the St. Paul & Duluth is Mr. George W. Bull, Agent of the Erie Dispatch, at Chicago.

—Mr. G. F. Copeland, Assistant Superintendent of the road has been appointed Superintendent.

ELECTIONS AND APPOINTMENTS.

Alabama Great Southern.—Charles Hammett has been appointed Assistant Engineer, with headquarters in Birmingham, with charge of the maintenance of way of this road. He has been in the engineering department of the system at Cincinnati.

Ashbourne, Cheltenham & Philadelphia.—The officers are: Robert Alexander, Philadelphia, Pa., President; Directors: Lynford Rowland, Cheltenham, Pa.; John A. Irvin, Ogontz, Pa.; William B. Gill, George W. Keim, John O. Keim and L. Shuster Boraef, of Philadelphia.

Atchison, Topeka & Santa Fe.—The organization of the local offices of the Accounting Department of these companies at Topeka, Kan., will be as follows after Feb. 3: H. C. Clements Auditor, in general charge of the offices;

W. K. Gillett, Auditor of Disbursements; C. S. Sutton, Auditor of Freight Receipts, and C. M. Atwood, Auditor of Passenger Receipts.

H. G. Thompson, Assistant General Passenger and Ticket Agent, with office at Topeka, Kan., has been transferred to the office of Passenger Traffic Manager White in Chicago as Assistant General Ticket Agent. W. J. Byrne, Assistant General Passenger and Ticket Agent, becomes Assistant General Passenger Agent.

Atlantic & Pacific.—R. M. Batcheller has been appointed Assistant General Freight Agent, with headquarters at Albuquerque, N. Mex., and C. H. Speers has been appointed Assistant General Passenger Agent, with headquarters at San Francisco. Mr. Batcheller will also act as General Agent of the Passenger Department.

Baltimore & Ohio Southwestern.—I. G. Rawn has been appointed General Superintendent of the road, with headquarters in Cincinnati, O.

Berlin Branch.—At the annual meeting of the stockholders of the road held at Abbotstown, Pa., Jan. 16, the following directors were elected: A. W. Eichelberger, Hanover, Pa., President; Jacob Resser, A. W. Storm, William S. Hildebrand, R. N. Meisenholder and Michael Rehbert, East Berlin, Pa.; Daniel Eberly and Joseph Wolf, Abbotstown, Pa.; Henry A. Young and Stephen Keepe, Hanover, Pa.

Brockville, Westport & Sault Ste. Marie.—The annual meeting of this company was held at Brockville, Ont., last week, when directors were elected as follows: R. G. Harvey, W. H. Cole, J. F. Wood, M. P.; G. H. Weatherhead, J. W. Downey, R. Bowie, W. B. Smellie, Chilion Jones, James Mooney, D. Derbyshire and A. Geiger. W. H. Cole was elected President; J. F. Wood, M. P., Vice-President; R. G. Harvey, Manager; James Mooney, Treasurer, and A. Geiger, Secretary.

Burlington & Missouri River.—E. Bignell, Assistant Superintendent of the Northern Division, succeeds David E. Thompson, resigned, as Superintendent of the Nebraska Division, with office at Lincoln, Neb.

Calgary & Edmonton.—William McKenzie, Nicol Kingsmill, Herbert T. Holt, Harry Symons, Donald Mann and T. G. Holt have petitioned the Dominion Parliament for incorporation.

Chicago, Burlington & Quincy.—Thomas Miller has been appointed General Freight Agent of this company, with headquarters in Chicago, vice Paul Morton, resigned. M. B. Davis has been appointed General Agent, with headquarters at room 49, Chapin Block, Buffalo, N. Y., vice P. Y. Griggs, deceased. F. K. Kelly has been appointed Traveling Freight Agent, with headquarters at Chicago, Ill.

Chicago & Eastern Illinois.—At a meeting in New York City this week D. J. Mackey, President of the Evansville & Terra Haute, was elected a member of the Board of Directors and President of the Chicago & Eastern Illinois. C. W. Hilliard, Secretary and Treasurer of the latter road, was chosen a director in the Evansville & Terra Haute. H. H. Porter, formerly President of the Chicago & Eastern Illinois, was chosen Chairman of the Board of Directors.

Connecticut River.—The directors of the road re-elected President N. A. Leonard at a meeting held in Springfield, Mass., Jan. 28.

Dayton & Union.—Henry F. Shoemaker has been elected President of the road.

Denver Resort.—T. S. Titcomb, of Boulder, Col., Assistant State Engineer, has been appointed Chief Engineer of this road.

Duluth, South Shore & Atlantic.—H. J. Payne has been appointed Chief Engineer, and C. H. V. Cavis Consulting Engineer of this road.

East Broad Top.—At the annual meeting of the road, recently held in Philadelphia, the following directors were elected: President William A. Ingham; Ario Pardee, Edward Roberts, Jr., Percival Roberts, Edward R. Wood, William Lilly, John B. Fell and G. Theodore Robert.

Fitchburg.—At the annual meeting of stockholders in Boston the old board of directors was re-elected, except that H. S. Marcy was elected President and a director in place of E. P. Phillips, resigned.

Grand Rapids & Indiana.—J. H. P. Hughart, Assistant to the President and General Manager, has been placed in charge of the Northern division, until a successor is appointed to the late John M. Metheany, Superintendent.

Gurleys & Paint Rock Valley.—The following were elected directors at a meeting at Gurleys, Ala., Jan. 18: M. A. Clay, S. Butler, William McMaples, J. P. Williams, F. B. Gurley, E. F. Walker, John W. Grayson, W. T. Hamer, and H. P. Williams.

Henrietta, Seymour & Pacific.—The following have been elected directors: Francis Fuller, Galesburg, Ill.; C. E. Grant, Galesburg, Ill.; I. N. Leeper, Farmington, Ill.; A. D. Goodenough, I. N. Graves, Samuel Davidson, and W. B. Wortham, of Henrietta, Tex.

Idaho North & South.—The trustees elected by this Idaho company are: President, J. F. Curtis, Boise City; Vice-President, J. R. De Lamar, of De Lamar; Charles F. Knapp, Owyhee County; Secretary, Charles A. McGee, Nampa; Treasurer, W. H. Ridenbaugh, Boise City, Idaho.

International & Great Northern.—T. M. Orr has been appointed General Agent of the road, with headquarters in the City of Mexico.

Jamestown & Franklin.—The annual meeting of the company was held at Stoneboro, Pa., last week. The following directors were re-elected: John Newell, O. G. Getzen-Danner and Leonard Watson, Cleveland; S. P. McCalmont, Franklin, Pa., and J. C. Cornwell and R. P. Cann, Stoneboro, Pa. Rasselas Brown, of Warren, Pa., was re-elected President.

Kinzua Creek.—The following are the directors of this company, just chartered in Pennsylvania: Nelson Moore, Warren, Pa., President; P. S. Dunkle and E. H. Langworth, Warren; Frank Morrison and M. Morrison, Morrison; F. P. Bell, Sheffield, and B. E. Mitchell, North Clarendon.

Lehigh Valley.—At the annual meeting of the stockholders of the company, held in Philadelphia, Jan. 21, the present board of directors was re-elected, as follows: President, Elisha H. Wilbur; Directors, Charles Hartsborne, William L. Conyngham, Arlo Pardee, William A. Ingham, Robert H. Sayre, James I. Blakslee, John

R. Fell, Robert A. Lamberton, John B. Garrett, Charles O. Skeer, William Brockie and Calvin Pardee.

Little Miami.—In the election of directors at Cincinnati, Jan. 28, the old board was re-elected, except L. Van Antwerp and A. Trum, whose places were filled by the election of T. S. Cunningham and Joseph J. Emery.

Livingston & Cokedale.—Thomas F. Oakes, of St. Paul; James B. Williams, of Stamford, Ct.; Henry Stanton and George S. Baxter, of New York, and George H. Earle, of Jersey City, are the incorporators of this Montana company.

Maryland Central.—The annual meeting of the stockholders of the road was held last week. The following directors were chosen: William Gilmor, Hugh B. Jones and George S. Brown, of Baltimore; A. C. Dravo and Marvin F. Scaife, Pittsburgh; Samuel Rea, Philadelphia, and Charles R. McConkey. Mr. Rea succeeds W. F. Walworth, of Cleveland, Ohio, and Mr. McConkey succeeds Frederick B. Hubbell, the General Freight and Passenger Agent. The directors chose the following officers: William Gilmor, President; Samuel Rea, Vice-President; John K. Shinn, of Pittsburgh, Secretary, and Fridge Murdock, Treasurer.

McKeesport & Bessmer.—At a meeting of stockholders this week Robert Pitcairn, C. A. Chipley, B. Trump, and B. W. Carskaddon, of the Pennsylvania, were elected to be directors of this road.

McKeesport & Youghiogheny.—At a meeting of the road held in Pittsburgh, Pa., Jan. 28, the following directors were elected: President, J. H. Reed; Cornelius Vanderbilt, William K. Vanderbilt, Hamilton McK. Twombly, James Tillinghast, John Newell, John M. Bailey, James L. Bennett, William Watson, Henry Hice.

Michigan Central.—A. J. Burt has been appointed Assistant Auditor with office at Detroit, Mich., in place of F. Baisted, resigned.

Minneapolis & St. Louis.—Charles Pratt has been appointed Acting General Passenger and Ticket Agent of the road, to succeed C. H. Holdredge, resigned to accept other service. O. C. Post has been appointed Auditor, with office at Minneapolis, to succeed R. G. Brown, deceased.

Natchez, Jackson & Columbus.—At a meeting of stockholders in Natchez, Miss., Jan. 21, the following directors were chosen, all being connected with the Louisville, New Orleans & Texas, save the first three named: W. T. Martin, J. W. Lambert, H. C. Roberts, J. T. Penton, A. M. Cook, T. J. Nicholl, W. L. Smith, M. T. Roberts, J. F. Van Name, A. Crolius, E. H. Pardee, T. H. Davis, J. E. Gates. The directors organized by electing the following officers: President, T. J. Nicholl; Vice-President, M. A. Cook; Secretary, J. T. Penton; Treasurer, Robert Hazlehurst.

New York, Ontario & Western.—J. E. Childs has been appointed General Manager of the road, and will enter on the duties of the office on Feb. 1.

Northern Pacific.—J. A. Nadeau has been appointed Assistant Superintendent and T. H. Tyndale General Agent, with headquarters at Seattle. The jurisdiction of the Assistant Superintendent will be between Meeker Junction and Seattle, including the Seattle Terminals.

North & South of Illinois.—The incorporators and first Board of Directors are C. H. Bosworth and John W. Pugh, of Springfield, Ill.; J. M. Stark, of Pawnee, and David D. Withers and G. L. Hoyt, of New York City.

Ohio, Indiana & Western.—W. F. Kearney has been appointed Master Mechanic of the road, with office in Indianapolis, vice John J. King, resigned. Mr. Kearney was for some years Division Master Mechanic of the Chicago, Burlington & Quincy road.

Ottawa, Waddington & New York.—The annual meeting was held in Ottawa last week, and the following directors were elected: T. C. Keefer, J. I. MacCracken, Alexander Farlinger, W. J. Anderson, T. B. Alderson, Hon. James Reddington, and Charles O'Dell. The board elected officers as follows: Charles O'Dell, President; W. J. Anderson, Vice-President; A. Farlinger, Treasurer, and J. I. MacCracken, Secretary.

Pajaro Valley.—John D. Spreckels, James B. Stetson, Myer Ehrman, John L. Koster and Michael I. Jones, of San Francisco, have chartered this company.

Perry County.—At a recent meeting the following directors were elected: President, John H. Sheibley; Abram Bower, James A. Gray, John H. Sheibley, B. F. Junkin, John Wister, Charles L. Harling, A. R. Johnston, Charles A. Barnett, Silas W. Conn, A. C. Shearer, David H. Sheibley, Charles H. Smiley.

Philadelphia, Wilmington & Baltimore.—The annual meeting of the stockholders of the company was held recently and officers and directors were elected as follows: President, G. B. Roberts of Philadelphia; Vice-President, Frank Thomson, Philadelphia; Secretary, J. C. Sims, Jr.; Treasurer, R. W. Smith; Directors, B. B. Comegys, G. R. Roberts, Frank Thomson, J. N. DuBarry, William Sellers, J. P. Green, Wistar Morris, Henry D. Welsh, of Philadelphia; Christian Feibiger, and E. Tatnall Warner, of Wilmington; Benjamin F. Newcomer, Skipworth Wilmer, German H. Hunt, of Baltimore; Jacob Tome, of Port Deposit; Edward Lloyd, Tunis Mills, Md.

Pittsburgh & Lake Erie.—At the annual meeting of the company held in Pittsburgh, Pa., Jan. 28, the following directors were elected: President, John Newell; Cornelius Vanderbilt, William K. Vanderbilt, F. W. Vanderbilt, Hamilton McK. Twombly, E. D. Worcester, W. M. Watson, Henry Hice, James I. Bennet, James M. Bailey, J. H. Reed, J. M. Schoonemaker and D. Leet Wilson.

Portland & Ogdensburg.—At the annual meeting of the company last week these directors were chosen: S. J. Anderson, C. H. Amnden, F. N. Dow, S. R. Small, F. Fessenden, Charles F. Libby, Holman S. Metcher, H. N. Jose, F. N. Milliken, and Thomas P. Shaw.

St. Catharines & Niagara Central.—At the annual meeting of the road, recently held at St. Catharines, Ont., the following directors were elected: Dr. Lucius S. Ollie, S. Neelon, A. A. King, W. W. Greenwood, E. A. Smith, of St. Catharines; F. W. Fearman, Hamilton; John Shields, Toronto. At the meeting of the directors Dr. L. S. Ollie was elected President, and S. Neelon, Vice-President.

St. Louis, Venice & Alton.—John Overall and George Greenwood, of St. Louis; J. K. Ewing, of East St. Louis, Ill.; and H. M. Needless, of Belleville, Ill., are directors in this company. E. E. Rutledge, of East St. Louis, is Chief Engineer.

St. Paul & Duluth.—A. B. Plough has been appointed General Manager. W. H. Bliss has been appointed Vice-President and General Solicitor. G. F. Copeland has been appointed Superintendent, and G. W. Bull has been appointed General Freight Agent, all with offices at St. Paul.

St. Paul & Northern Pacific.—Charles J. Colby, President of the Wisconsin Central, has been elected President of this road.

San Joaquin Valley.—The officers of this California company are: Marcus Polasky, of Chicago, President; Thomas E. Hughes, Vice-President; Gilbert R. Osmun of Detroit, Mich., Secretary; H. D. Colson, Treasurer; John D. Gray and William W. Williams, Directors.

Sault Ste. Marie & Hudson Bay.—The projectors of this road, who are applying to the Dominion Parliament for a charter, are: Joseph Cozens, R. D. Perry, J. T. Stradly, T. W. Burdick, J. H. Steere, W. N. Bell, W. N. Simpson, and J. McKay, of Sault Ste. Marie.

Schenectady & Albany.—Verplanck Colvin, C. H. Ben-thyssen, Henry Russell, James H. Manning, J. W. Van Valkenburgh, of Albany, N. Y.; J. H. Ramsey, Howes Cave, N. Y.; James Hendrick, New Scotland, N. Y., are the directors of this new road.

Seaboard.—The company has filed at Montgomery, Ala., a notice of its organization, and that the following board of directors has been elected: E. R. Upham, Robert Middleton, E. H. Barnes, W. J. Best, Frank Rudd, H. C. Burrows and H. D. Haven. Officers have been elected as follows: H. D. Haven, New York City, President; E. R. Upham, Vice-President, and Robert Middleton, Mobile, Ala., Secretary and Treasurer.

Unadilla Valley.—The directors named in the charter recently filed in New York are: R. Floyd Clarke, Frederick F. Culver, Benjamin Wright, Cornelius V. Sidel, Charles D. Ingersoll, Russell H. Eoadley, all of New York City, and William D. Edwards, Jersey City, N. J.

Union Pacific.—F. I. Smith has been appointed General Agent of this company, with headquarters at Denver, Col., office at corner of Seventeenth and Larimer streets. Michael F. Egan, Division Master Mechanic of the Union Pacific, with office at Denver, Col., has had his jurisdiction extended over the Denver, Texas & Fort Worth.

Union Stock Yards & Transit Railroad Co.—The annual meeting of the Board of Directors of the company was held in Chicago, Jan. 28. The following officers were elected for the ensuing year: N. Thayer, President, Boston; John D. Sherman, Vice-President and General Manager, Chicago; George T. Williams, Secretary and Treasurer, Chicago; J. C. Denison, Associate Secretary and Treasurer, Chicago. Directors: N. Thayer, John Newell, John B. Sherman, J. N. McCullough, M. Huggitt, J. C. McMullin, R. R. Cable, H. B. Stone and Stuyvesant Fish.

Wilkesbarre & Western.—At the annual meeting of the stockholders of this company, Joseph M. Gazzam was elected President. S. H. Hicks has been appointed General Manager, in addition to his duties as Superintendent. Robert C. Belville has been appointed Secretary and Treasurer, with office in the Girard Building, Philadelphia.

Youngstown & Buffalo.—This company, which was chartered about two years ago, has recently been reorganized, and the following officers have been elected: President, William Wilkeson, Lewiston, N. Y.; Vice-President, A. H. Dutton, Youngstown; Secretary, J. M. Dipson, Youngstown; and Treasurer, Thomas Brighter, Youngstown.

OLD AND NEW ROADS.

Ashbourne, Cheltenham & Philadelphia.—Incorporated in Pennsylvania to build a road from Ashbourne station on the Philadelphia & Reading, in Montgomery County, southeasterly to a point in the city of Philadelphia at or near Cheltenham station on the Philadelphia, Newtown & New York road, which is operated by the Philadelphia & Reading. The length of the new line will be three miles long. The capital stock is \$60,000.

Atlantic & Danville.—This road was formally opened from Portsmouth west to Danville, Va., a distance of 207 miles, Jan. 22, a passenger train in two sections being run over the entire distance that day.

Augusta & West Florida.—J. H. Burkhalter, of Augusta, Ga., is the contractor for the work now in progress on this road at Belleville, six miles from Augusta. This six miles will be the first section of the line to be completed. Then work will be begun between Belleville and Midville, on the Midville, Swainsboro & Red Bluff road.

Blue Mountain Mineral.—The contractors for the grading and tracklaying of this road, McDonald & Campbell, of Anniston, Ala., have commenced grading. The road will be about 25 miles long; the main line from Anniston to Jacksonville, Ala., will be 17 miles. There will be several short branches, and probably a belt line at Anniston.

Burlington, Stillwater & St. Paul.—Articles of incorporation have been filed by the company at Madison, Wis., to construct a road from St. Croix Falls through the counties of St. Croix, Dunn, Pepin and Pierce, to Pepin, a distance of 125 miles. The capital stock is \$3,000,000.

Cache River Valley.—This line, referred to last week, is a private timber road, being built by C. F. Collins, Odd Fellows Building, St. Louis, to penetrate a large body of timber owned by him, and for the purpose of enabling him to fill contracts for ties and railroad timbers promptly. The road begins at Shotwells, a point on the Kansas City, Fort Scott & Memphis, 80 miles west of Memphis, and extends in a northerly direction between Crowleys Ridge and Cache River for about 20 miles. The clearing and grading is being done by a force of about 200 men. The rails have been delivered. The maximum grade is 40 ft. to the mile.

Chattanooga, Gadsden & Birmingham.—The company is completing arrangements for building its line, and expects to begin construction work in a short time. The grading will begin at Gadsden, Ala., working south toward Birmingham. Negotiations are being conducted with the Chattanooga southern road for trackage rights over that road into Chattanooga, Tenn., when it is completed, and this matter will be settled shortly. J. C. Henderson, of Chattanooga, is General Manager.

Chesapeake & Ohio.—The following report gives the earnings of the road for the six months ending Dec. 21:

	1889.	1888.	Inc.
Gross earnings.....	\$3,535,000	\$2,694,000	\$841,000
Oper. expenses.....	2,411,000	2,080,000	331,000
Net earnings.....	\$1,094,000	\$614,000	\$480,000

Chicago & Eastern Illinois.—The President of the company pronounces as premature all reports of a consolidation or traffic agreement with the Evansville & Terre Haute. In two or three months it is possible that a consolidation may be effected.

Connecticut River.—The directors of the road at a meeting Jan. 28 voted to consolidate with the Andover line, which extends from South Vernon, Vt., to Keene, N. H., 25 miles, which has been operated by the Connecticut River road since 1877 under a lease which provides for a rental of 30 per cent. of the gross earnings of the road. The rental now amounts to eight per cent. on the capital stock, which is all held by the Connecticut River road.

Covington & Macon.—A stockholders' meeting was held in Macon, Ga., last week, to consider the recent action of the directors of the road in issuing the issue of the bonds to the amount of \$642,000, for the payment of the floating debt, expenditures on maintenance of way and increasing the terminal facilities in Athens and in Macon. The resolution authorizing the issue of bonds was passed unanimously. The bonds will be income bonds, running 25 years, and bearing six per cent. interest. The issue is for \$642,000, at the rate of \$1,000 per mile, on the 107 miles of road. There is an issue of first mortgage bonds at the rate of \$12,000 per mile, the holders of which claim \$300,000 in unpaid interest. The company claims that \$100,000 of this amount is not valid.

Deer Creek & Susquehanna.—Seven miles of this road, extending from Belair, Md., to the river, has been graded, and five trestles erected, at a cost of \$67,075. Work on the road will be resumed in the spring. It is an extension of the Maryland Central.

Elgin, Pettescodiac & Havelock.—On petition of the bondholders of this road in a small amount brought in the Equity Court at St. John, N. B., last week, Thomas R. Jones was appointed Receiver of the road, which extends from Elgin to Havelock, N. B., 27 miles.

Fitchburg.—The annual meeting of the company was held in Boston, Jan. 28. The stockholders voted to authorize the directors to issue bonds not exceeding \$1,000,000 to pay off the floating debt.

Florida Central & Peninsular.—Eight miles of the extension from Plant City to Tampa, Fla., has been completed ready for tracklaying, which will soon be commenced on this section. The grading on the remaining 12 miles of the line will probably be completed by March 1.

Fort Madison & Northwestern.—Judge Love, of the United States Circuit Court at Keokuk, Ia., has again refused to confirm the sale of the road, which was recently made to parties represented by Receiver Gilchrist, for \$27,900. He announced that unless those interested in the road bid somewhere near the value of the line he would have to order it abandoned and the track torn up and sold for old iron.

Goderich & Pacific.—This is the new name of the Goderich & Wingham. It is claimed that construction will begin in a few months from Goderich to Wingham, Ont. It has been rumored recently that the Canadian Pacific would extend its Guelph Junction branch from Guelph to Goderich, but this is not confirmed.

Gurleys & Paint Rock Valley.—The company expects to let the contract for grading the road in May. The route is from Fort Deposit, on the Tennessee River, north, across the Paint Rock River at New Hope, Ala., thence up the Flint River Valley to Gurleys on the Memphis & Charleston, thence up the Paint Rock Valley to Winchester, Tenn., a distance of 60 miles. There will be three iron bridges, two of which will have two spans each 80 ft. long. Through the Paint Rock Valley the line will traverse a rich mineral section, and the rest of the line is through a fertile farming district. Frank B. Gurley, of Gurleys, is interested.

Henrietta, Seymour & Pacific.—This is the name of a company being organized at Henrietta and Seymour, Tex., to build a road from Henrietta on the Missouri, Kansas & Texas south west to Seymour, about 50 miles. The towns along the line have been asked to subscribe to the capital stock of the company.

Idaho North & South.—Articles of incorporation have been filed in the Territorial Secretary's office at Boise City, Idaho, by this company, which proposes to build a line of road from Nampa northeasterly through the counties of Ada and Boise, by way of Star, Emmett and Horseshoe Bend on the Payette River, thence in a north west direction via Long Valley, Big Payette Lake and Lewiston to Spokane Falls. The capital stock will be \$3,000,000.

Interoceanic.—On the Mexico and Vera Cruz line the tracklaying has reached a point about ten miles beyond Progreso, Mex., the present terminus, toward Jalapa. This line is in operation from the City of Mexico to Puebla, and between these points a large force is engaged replacing the temporary bridges with permanent structures. The Morelos branch is completed from the City of Mexico, through Cuantla Morelos, Yankapac and Tlatizapam, to Jotula, eight miles beyond Tlatizapam, which is 114 miles from the City of Mexico, and to which point the branch is in operation.

Engineers are surveying the line between the City of Mexico and Puebla, and are reported to have secured a route which is 60 miles shorter than the present line. The maximum grade between Ayolla and San Martin Texmelucan is four per cent., but this can be reduced if a tunnel is built through the summit of one of a range of mountains.

Kinzua Creek.—This company has been incorporated in Pennsylvania to build a road from a point near Anderson switch, on the line of the Western New York & Pennsylvania, in McKean Co. Pa., thence along the Kinzua Creek to a point on the line of the New York, Lake Erie & Western near what is known as the Big Bridge in McKean County. The length of this road will be 12 miles. The capital stock is \$120,000. Nelson Moore, of Warren, Pa., is the President.

Lake City & Tampa.—A company of this name has been recently chartered in Florida to build a line about 150 miles long between Lake City and Tampa, Fla.

Little Miami.—The stockholders of the company, at their annual meeting in Cincinnati Jan. 28, voted to approve the action of the directors in increasing the cap-

ital stock \$3,000,000, and issuing \$3,000,000 of 7½ per cent. bonds.

Livingston & Cokedale.—The company has been incorporated in Montana by officers of the Northern Pacific to build a road to commence at a point about four miles west of Livingston on the Northern Pacific, and thence up Eldridge Creek to Cokedale, a distance of three miles. The capital stock is \$300,000.

Louisville & Nashville.—The directors of the company have decided to issue the \$13,000,000 stock authorized at the last annual meeting, for the purpose of redeeming the six per cent. trust bonds and other obligations bearing interest and to offer the new stock to the shareholders at 85 per cent. The entire success of the plan, by the taking of all the stock, has been guaranteed by a syndicate represented by prominent bankers in New York and Europe. The change in securities results in a saving of \$600,000 per annum in fixed charges, being interest on trust bonds, and a further reduction of sinking fund obligations to the amount of \$100,000 per annum.

Louisville, New Orleans & Texas.—Twenty-five miles of the Clarksdale branch from Clarksdale south toward Yazoo City, Miss., has been graded, and it is reported that the right of way has been secured as far as Yazoo City; but it has not yet been decided to continue the line as far south as that city.

The company has given notice that it has discontinued receiving freight for points on its Clinton & Port Hickey branch west of Ethel, La., as that portion of the line will be abandoned and tracks torn up.

Manhattan (Elevated).—The stockholders of this company and of the Metropolitan are to hold a special meeting in New York City, Feb. 26, to vote on the proposition to issue a consolidated mortgage of \$40,000,000 to cover the existing obligations and provide for possible new construction at the rate of \$600,000 a mile on double track and \$300,000 a mile on single track. The project has been contemplated for some time. The new mortgage bonds will be for 100 years at the rate of four per cent. It was designed to meet the existing indebtedness as it fell due, to pay off the interest-bearing scrip issued for dividends to stockholders and provide for betterments to the property. The present bonded indebtedness of the elevated system is about \$34,000,000, and it will be seen that the plan contemplates the issue of \$6,000,000 more bonds than that of the present issues. The Manhattan leases the New York and the Metropolitan roads. The indebtedness of the leased companies includes: Metropolitan first mortgage six per cent. bonds, \$10,818,000; Metropolitan second mortgage six per cent. bonds, \$4,000,000; New York Elevated first mortgage seven per cent. bonds, \$8,500,000; New York five per cent. debenture bonds, \$1,000,000; total, \$24,318,000. The Metropolitan firsts do not fall due until 1908; the seconds fall due in 1899. The New York firsts do not fall due before 1906 and the debenture bonds not before 1916. The dividend scrip amounts to about \$2,000,000. The scrip and the underlying bond issues amount to \$26,000,000 in round numbers. The remaining \$14,000,000 will be devoted to buying new equipment, to the purchase of land for terminal facilities at the upper end of Manhattan Island, to strengthening the Ninth avenue structure so as to permit the running of heavier and longer trains and to any construction rendered necessary by the World's Fair of 1902. It is intended to apply \$3,500,000 of the extra bonds to the payment of the property judgments, which it is thought can be covered by that sum. The fixed charges on the bonds now outstanding amount to \$1,545,000. The interest on the proposed four per cent. bonds would be \$1,600,000.

Manitoulin & North Shore.—The survey for this line has been in progress since Jan. 2, and about 15 miles has been surveyed from Little Current, Ont. The proposed line is 28 miles long, from Little Current to Nairn, Ont. On the section surveyed there is one curve, and the highest grade is 18 ft. per mile. The only large river crossing is the channel of the Little Current, which is 740 feet wide, but much of this distance is shallow water.

McKeesport & Bessemer.—The Pennsylvania is reported to have secured control of this road and of its rights of way. The line has been surveyed from a point near the mouth of the Youghiogheny River, in McKeesport, down the Monongahela River through the manufacturing district of the city and a short distance below, across the Monongahela to the south side of the river, thence to Bessemer, to a junction with the Pittsburgh, Virginia & Charleston division of the Pennsylvania.

Meridian, Brookhaven & Natchez.—Meetings have been recently held, or are proposed, at Brookhaven, Monticello, Miss., and intermediate towns, to forward a project for building a road from Brookhaven, Lincoln County, east to the Mississippi River at Monticello, Lawrence County, about 20 miles. It is also proposed to continue the line west to Natchez. Legislation is to be asked to permit Lincoln and Lawrence counties to vote on a proposition authorizing the counties to issue \$50,000 in bonds in aid of the road.

Michigan Central.—The company has recently had a reconnaissance made from Oxford, Mich., northwest through Goodrich and Flint to Flushing, a distance of about 35 miles.

Missouri Pacific.—The grading on the extension from Fort Scott, Kan., northeast to Tipton, Mo., has been nearly finished between Fort Scott and Rich Hill, Mo., a distance of about 27 miles. The tracklaying will be commenced in two or three weeks, and completed between these points immediately. The surveys have been made from Rich Hill for 50 miles through Appleton City, Mo., and toward Coal Camp on the Warsaw branch of the road.

Montgomery, Tuscaloosa & Memphis.—The contract for grading the road for the Alabama River, near Montgomery to Maplesville, Ala., have been let, in five sections, and work is in progress on the entire distance. The largest force at work is grading between Montgomery and the Alabama River.

Montreal & Ottawa.—This company, formerly the Vaudreuil & Prescott, ran a special train over its line from Vaudreuil to Hudson, P. Que., last week. Regular trains will probably be put on between Vaudreuil and Rigaud before the end of February.

New Orleans & Northwestern.—Surfacing and ballasting is in progress on the line between Vidalia, La., and the Texas River, 25 miles, on which the tracklaying has been completed. The bridge over the Texas River will soon be finished, and then tracklaying will be resumed west of that point to the connection with the Vicksburg, Shreveport & Pacific.

New York, Lake Erie & Western.—The earnings and expenses for the month of December and quarter to Dec. 31 were as follows:

Month of December.			
	1889.	1888.	Inc. or Dec.
Gross earnings.....	\$2,187,861	\$2,141,803	I. \$46,058
Oper. expenses.....	1,566,294	1,457,121	I. 109,173
Less proportions due leased lines.....	\$621,567	\$684,682	D. \$63,115
Net earnings.....	218,892	199,213	I. 19,679
For three months, Oct. 1 to Dec. 31.			
Gross earnings.....	\$7,472,034	\$6,964,417	\$507,617
Oper. expenses.....	4,836,594	4,457,645	378,949
Less proportions due leased lines.....	\$2,635,440	\$2,506,772	\$128,668
Net earnings.....	\$1,940,052	\$1,897,947	\$42,105

Norfolk & Western.—Contracts have been awarded for double-tracking this road between Roanoke and Radford to Codwise & Allen, Lynchburg, from Roanoke to Deyerle's; John Kelly, Lynchburg, five miles west from Deyerle's; E. J. Gaynor & Son, Pottstown, Pa., five miles east of Big Spring, and from Christiansburg to Radford; Jones & Thorne, Baltimore, Bluefield to Blue-stone Junction; all contractors will begin work within a week. The double track will be first built to Radford, 44 miles west of Roanoke, and then between Roanoke and Lynchburg.

Northeast Pennsylvania.—Contractors have commenced work on the extension of the road from Harts-ville, Bucks Co., Pa., to New Hope, a distance of 16 miles. When the extension is completed the line will be 26 miles long, from Abington, Montgomery County.

Northern Pacific & Manitoba.—The company is reported to have surveyed a line from Morris, west into the northwest, practically parallel to the Canadian Pacific through Southern Manitoba, Assiniboia and Alberta.

North & South of Illinois.—Articles of incorporation have been filed at Springfield, Ill., by this company, with a capital stock of \$12,000,000, to construct and operate a line of road from Eureka, Woodford County, to Alhambra, Madison County. The company has been organized to succeed the St. Louis & Chicago, which was recently sold under a decree of the General Court to F. C. Hollins and others of New York.

Ontario, Carbondale & Western.—The grading on this extension of the New York, Ontario & Western from Hancock, N. Y., to Scranton, Pa., 51 miles, is practically finished. The heaviest work was at Hancock, and C. F. Mears, of 57 Broadway, New York City, who had a four-mile section on this part of the line, and other contractors, have removed their forces. Some tracklaying has been done, but contracts for this work have not yet been let, and the track that has already been put down was laid by the employees of the company. Little progress is being made in finishing this work on account of the small force on the work.

Pajaro Valley.—This company has been chartered in California to build a road from Watsonville, Santa Cruz County, to Salinas, Monterey County, a distance of about 20 miles. Thirty thousand dollars of the capital stock has been subscribed.

Pennsylvania.—The statement of the business of all lines of the company east of Pittsburgh and Erie for December, 1889, as compared with the same month in 1888, shows an increase in gross earnings of \$687,182; an increase in expenses of \$218,700; an increase in net earnings of \$468,482. The twelve months of 1889, as compared with the same period of 1888, show an increase in gross earnings of \$3,342,367; an increase in expenses of \$1,765,652; an increase in net earnings of \$1,576,715. All lines west of Pittsburgh and Erie for the twelve months of 1889 show a surplus over all liabilities of \$1,092,817, being a gain as compared with the same period of 1888 of \$1,202,902.

Philadelphia & Reading.—The statement of the operations of the railroad for the month of December, 1889, as compared with same month of 1888, is as below:

	1888.	1888.	Inc.
Gross receipts.....	\$1,654,942	\$1,400,512	\$254,430
Gross expenses, excl. rent and interest.....	989,442	836,177	153,265
Net earnings.....	665,500	564,335	101,165

Philadelphia & Sea Shore.—Tracklaying is reported in progress on this line at several points. Grading has been going on for some time. The road is being constructed from Winslow, N. J., on the Philadelphia & Reading, south to Cape May, 54 miles, with a nine-mile branch to Sea Isle City. The following towns are reached: Folsom, Newtonville, Pancoastville, Richland, Doughty's Station, Tuckahoe Junction, Middletown, Petersburg, Seaville, Dennisville, Goshen, Cape May Court House and Rio Grande. The company is said to have secured trackage rights over the Philadelphia & Reading from Winslow to Camden, N. J.

Port Edwards, Centralia & Northern.—The company was incorporated at Madison, Wis., Jan. 24, with a capital stock of \$200,000, to construct a road from the village of Port Edwards, in Wood County, northerly through South Centralia, Centralia and Vesper to some point on the Wisconsin Central road.

Puget Sound Shore.—The railroad and property of this company has been transferred to the Northern Pacific, the consideration being \$1,000,000 of the new consolidated mortgage bonds of the Northern Pacific. The road extends from Stuck Junction, 18 miles north of Tacoma, Wash., to Seattle, a distance of 23 miles. The line will be operated as part of the Pacific division, and the general and division officers of the Northern Pacific will have jurisdiction accordingly.

Red River, Sabine & Western.—Palestine, Tex., Jan. 11.—It was reported in the city yesterday evening that a number of men, wagons and teams had arrived for work on the new railroad that is to be. The *News* correspondent was moved to an immediate investigation of the rumor, and for that purpose went out to a grove of timber near where the right of way was cut out last August for the Red River, Sabine & Western, and he found a big tent, a wagon, nine children and one at the breast. In answer to questions in regard to his coming, the man said he had pitched his tent there until he could look around and rent or buy some land, and didn't come here to build railroads; yet if Palestine wanted a new

road and desired him to boss the job he was in for it, him and the two mules and the wagon.

St. Albans & Coal River.—The company is to apply for a charter to extend the road from Boone C. H. to Logan C. H., and thence to the Kentucky State line to connect with the Norfolk & Western. Also a branch up the Guyandotte into Wyoming County, a projected distance, altogether, of 190 miles.

St. Louis, Venice & Alton.—This road has been recently chartered in Illinois to build a line from Alton to Venice, to connect with the eastern approaches of the St. Louis Merchants' Bridge. The Alton, Venice & East St. Louis has also been recently incorporated to build over the same route. The right of way for the former line is reported to have been secured for the greater part of the distance, and the survey of part of the line has been made. E. E. Rutledge, of East St. Louis, is the Chief Engineer.

San Joaquin Valley.—The company has been formed at Fresno, Cal., with \$75,000 of the capital stock reported as paid in, to build a road 75 miles long, to commence at Fresno, and extend up Kings River, along the western slope of the Sierra. Marcus Pollasky, of Chicago, is President of the company.

Schenectady & Albany.—Articles of incorporation filed in New York for a road from a point near Schenectady, on the survey of the New York Northern road, thence southeasterly through the counties of Schenectady and Albany to a point near Albany, connecting with the survey of the New York & Albany Co. The length of the proposed road is 15 miles and the capital stock is placed at \$150,000.

Southern Pacific.—It is reported that on account of recurring floods in the Valley of the Doledad River the company will abandon its present line, which follows the river, and build a new line on the mountain from Acton to Sangus, Cal., about 22 miles.

South Shore.—A bill has been introduced in the Rhode Island Legislature to charter this road to build from a connection with the Newport & Wickford road, thence to Narragansett Pier and to the main line of the New York, Providence & Boston, making a detour from Wickford Junction to Kingston. It is also proposed to extend the line to Watch Hill.

Toledo, Ann Arbor & North Michigan.—The extension of the road known as the Toledo, Ann Arbor & Lake Michigan road was, at a recent meeting of the directors, consolidated with the main line. The road is running trains through from Toledo to Lake Michigan via Frankfort and Manistee from Copemish Junction.

Unadilla Valley.—The company of this name filed articles of association with the Secretary of State, at Albany, N. Y., on Jan. 25, for the purpose of constructing a road from Bridgewater, Oneida County, N. Y., on the Delaware, Lackawanna & Western, through the towns of Brookfield, Madison County, Columbus and New Berlin, Chenango County, to New Berlin, on the New York, Ontario & Western. The length of the road is to be 19½ miles, and the capital stock is \$200,000.

Virginia & Western.—Engineers are making surveys for a line from Buchanan, Botetourt County, through Marion and Southwestern Virginia to a point near Kingston, Tenn. The road is a division of the Tennessee Midland, and nothing in the way of active construction will be done for some time.

Wheeling, Wellsburg & State Line.—A meeting of the stockholders of this company will be held in Wellsburg, W. Va., on March 20, for the purpose of considering an agreement of consolidation and merger of this company with the Pittsburgh, Canonsburg & State Line. The projected line is about 65 miles long, from Wheeling and Wellsburg, W. Va., through Canonsburg, Pa., to Pittsburgh.

Wisconsin Central.—The traffic agreement between the Northern Pacific and the Wisconsin Central, which went into effect last July, has been changed into a lease, based on a fixed percentage (35 per cent.) of gross earnings. Under a lease the Northern Pacific can control the Wisconsin Central system, with the terminal properties at Chicago. The parts of the system in Wisconsin, Iowa and Illinois are subject to different legal conditions, and the Chicago terminals are owned by three separate companies. It is to combine all these interests that the lease has been made. The Northern Pacific cannot purchase the Wisconsin Central securities, because it has no right to buy railroad properties, and it could not issue stock or bonds for the acquisition of other lines. A consolidation would involve a change of securities or an absolute guarantee.

Youngstown & Buffalo.—The company has been recently reorganized, and it is claimed that work will begin in the spring on the road between Youngstown and Lewiston, N. Y., north of Niagara Falls.

TRAFFIC.

Traffic Notes.

The blockade of cars on the Philadelphia & Reading last week was 3,425 cars, instead of 11,000, as published.

Through westbound freight tariffs have been made from the Atlantic seaboard to St. Paul, via Ledington and Manitowoc, giving rates to St. Paul the same as via Chicago.

The arrangement between the Chicago & Alton and the Kansas Division of the Union Pacific, by which through passenger trains will be run between Chicago and Denver, is, according to reports, to go into effect March 1.

The Chicago, Rock Island & Pacific has issued a circular announcing one-half tariff rates on wheat from stations in Kansas to milling stations, the bill of lading to specify that the product shall be forwarded over the Rock Island.

The St. Louis Car Service Association reports the average detention of cars (on the west side of the Mississippi) in November at 2.01 days, as compared with over six days for the same month last year. In December the average detention was 1.90 days. The Central Illinois Car Service Association has been formed at Peoria, and includes Pekin. Herbert Walker is General Manager.

A concern called the Merchants' and Shippers' Railway Claim Clearing Association has collected from quite a number of Boston shipping firms membership fees of \$10. The alleged object of the association was to facilitate the movement of freight, handle claims against the railroads, etc., and it was claimed that friendly relations existed with the railroads, but all the prominent roads deny knowledge of it.

A number of Jasper County (Iowa) shippers have sued the Chicago, Rock Island & Pacific to recover rebates equal to those allowed certain other shippers on shipments made during 1880-84. There are nearly 3,000 suits, aggregating \$48,000. The Supreme Court of Iowa holds that as no statute on this subject was in existence at the time the shipments were made, the actions must be determined under the common law.

The newspapers of Atlanta, Birmingham and other Southern cities print long accounts of the large numbers of negroes being carried by the railroads from North Carolina to Mississippi and Arkansas and other States west. Agents making various representations—truthful and otherwise—concerning opportunities for making a good living in the Western States named, have succeeded in creating what is called an exodus, and it is estimated that 20,000 negroes have left North Carolina within the past few weeks.

Chairman Walker, of the Interstate Commerce Railway Association, has decided the application of the St. Louis & San Francisco for permission to make rates on grain from points in Kansas to St. Louis, based on the through rates via Kansas City, to offset the advantage to Kansas City operators gained by the present transit arrangement on grain shipped from Kansas points to Kansas City and thereafter consigned to St. Louis and Chicago. The decision, while admitting the discrimination in favor of Kansas City as against St. Louis, refuses the application. Chairman Walker says that the granting of the application would establish a lower basis of through rates upon all lines from the territory in question, and this would apply by way of Kansas City as well as by way of the direct routes to St. Louis. Transit would be applied to the new rates at Kansas City, and the existing difficulty would be immediately reproduced.

Coal Men and Car Service Associations.

The Buffalo Express, reporting the conferences between the railroads and consignees in that city, has the following:

This Car Service Association is merely a scheme of the railroads to gain an advantage for themselves, said a prominent leader yesterday, and I hardly think it is legal under the provisions of the Interstate Commerce Law. Rule 5 provides that the railroads can hold soft coal on track without charge, while the dealer must remove it within 48 hours. Take, for instance, Bell, Lewis & Yates and the Buffalo, Rochester & Pittsburgh. The former must unload their coal in 48 hours, while the latter, which is a competitor of the former, can hold the cars for an unlimited time without charge. Is this just? Then again, take rule 3. It gives the anthracite men 120 hours to unload, where the bituminous men get only 48 hours. Why this discrimination? Because there are more roads interested in anthracite coal than there are in bituminous. This is discrimination of the worst kind, and you needn't be surprised to see the matter brought before the Interstate Commerce Commission before we get through.

The Central Traffic Association.

The address of Chairman Blanchard, at the last meeting of the General Managers, on the subject of the reorganization of the association, has just been made public. The Evansville & Terre Haute and the Peoria, Decatur & Evansville are prepared to become members, and likewise the companies controlled by the "Big Four." The Wabash has signed, making an exception of its line from Chicago to Detroit. The vote of the Pennsylvania Co. in the passenger committee would be equivalent to nine votes, which would practically constitute a controlling vote of a quorum. The inspection bureau for seven months returned increased revenue to the companies, at the rate of \$670,000 per year, and is therefore a great deal more than self-sustaining. Notwithstanding the prohibition of the law, misdescriptions and misclassifications of goods are continually increasing.

A call has been issued for a meeting of the managers of the lines in the association, to be held Feb. 5, to consider the status of the old and the new contracts; the views of those who have not signed the last agreement; the report of the committee appointed to solicit increased membership in the association; the report of the Passenger Committee on the reorganization of the passenger department; recommendations of the Passenger Committee relative to the compilation of statistics of passenger traffic.

Boston & Maine and the Poughkeepsie Bridge.

A traffic contract has been closed between the Central New England & Western and the Boston & Maine, by which the latter obtains a direct connection with Pennsylvania and the West by way of the Poughkeepsie Bridge, and the former gets access on favorable terms for the transportation of coal and general freight to all the territory covered by the Boston & Maine. Through traffic will pass for the present over the Central New England & Western to Simsbury, Conn.; thence to Northampton, Mass., by the Northampton division of the New York, New Haven & Hartford, and from Northampton eastward by the Central Massachusetts division of the Boston & Maine.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all lines for the week ending Saturday, Jan. 25, amounted to 106,076 tons, against 128,096 tons during the preceding week, a decrease of 22,020 tons, and against 56,500 tons during the corresponding week of 1889, an increase of 49,576 tons. The proportions carried by each road were:

	W'k to Jan. 25.		W'k to Jan. 18.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	13,964	13.2	17,755	13.8
Wabash.....	4,968	4.7	6,258	4.9
Lake Shore & Michigan South.	20,824	19.6	20,734	16.2
Pitts., Ft. Wayne & Chicago.....	12,157	11.5	12,521	9.8
Chicago, St. Louis & Pitts.....	8,714	8.2	11,046	8.6
Baltimore & Ohio.....	10,787	10.2	15,458	12.1
Chicago & Grand Trunk.....	12,453	11.7	16,413	12.8
New York, Chic. & St. Louis.....	9,217	8.7	10,512	8.2
Chicago & Atlantic.....	12,972	12.2	17,399	13.6
Total.....	106,076	100.0	128,096	100.0

Of the above shipments 6,777 tons were flour, 62,855 tons grain, 2,681 tons millstuffs, 8,413 tons cured meats, 4,352 tons lard, 9,167 tons dressed beef, 934 tons butter, 1,522 tons hides, 144 tons wool and 4,542 tons lumber. The three Vanderbilt lines together carried 41.5 per cent. of all the shipments, while the Pennsylvania lines carried 19.7 per cent.